

Status Report No. 2, Retrofit Pilot Program, Caltrans Districts 7 & 11

July 14, 1998 CTSW-RT-98-099

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Status Report #2 BMP Retrofit Pilot Program Districts 7 and 11

1.0 INTRODUCTION

Periodic status reports are specified in both the District 7 and District 11 Scoping Studies. The purpose of the reports is to provide a mechanism to update the Plaintiffs on the progress of the BMP Retrofit Pilot Program and receive input as to appropriate or changes or modifications to the program. The reports are supported with status meetings, which generally coincide with milestones in the program activity. The first report and meeting were delivered on March 30, 1998. This is the second progress report and the status meeting is on July 14, 1998.

This report and its corresponding status meeting coincide with the completion of the BMP Designs and the beginning of Construction related activities. Other concurrent activities include preparation of General and Site-Specific Operation, Maintenance and Monitoring (OM&M) Plans, Vector Control Activities related to the pilot projects, environmental multi-agency jurisdictional issue resolution, and biofilter sod research.

The Plaintiffs have had opportunities to review and comment on draft documents prepared during the project. However, this status report provides an opportunity to present the status of all of the activities in a single document and to provide an update of the schedule presented in the Scoping Studies and other documents.

2.0 BMP RETROFIT PILOT PROGRAM DESIGN

Design of the BMP Retrofit Pilot Projects and the development of the associated documentation has progressed per the schedule defined in the *Scoping Study* since the first Status Meeting on March 30, 1998. The following items will be discussed in this section:

- PS&E design packages for District 7 and District 11
- Procurement package designs for District 7 and District 11
- Engineer's cost estimates
- Plaintiff Review
- Decision Point No. 1

2.1 PS&E Design Packages

Three PS&E design packages have been developed, two in District 7 and one in District 11 respectively. Each of the PS&E packages has been submitted to Caltrans Headquarters for compilation of the bid



package and selection of the construction contractor. The general process for bidding and award of the PS&E packages through Caltrans headquarters is as follows:

Milestone	Timing
Step 1: District Approval, Submit to HQOE	
Step 2: HQOE Review	1 week
Step 3: Ready to List (RTL)	1 day
Step 4: HQOE prepares final contract documentation	6 weeks
Step 5: Advertise	4 weeks
Step 6: Bid Opening	5 days
Step 7: Award	1 day
Step 8: Construction Begins	1 day

Each of the three PS&E packages has received District review and approval (step 1), and has been submitted to Caltrans headquarters for Office Engineer (HQOE) (step 2) review.

2.1.1 District 11 PS&E Package

The District 11 PS&E package has been significantly modified since the March 30, 1998 Status Meeting. The original PS&E package content and the revisions are:

Project 1

- 1. Extended Detention Basin at I-15/SR 78 interchange*
- 2. Extended Detention Basin at I-5 (NB) at Manchester Ave.

Project 3

Extended Detention Basin at I-5/SR 56 interchange Infiltration Basin I-15 (SB) at La Costa Blvd.*

Project 4

Wet Basin at I-5 (SB) at Manchester Ave.

Project 4 has been eliminated pending additional definition of the design criteria in consultation with the Plaintiffs. Site 2 of Project 1 was also eliminated pending refinement of the design and additional consultation with the Plaintiffs. These changes are shown in strikeout above. The Plaintiffs and Caltrans have agreed to proceed with the construction of the three remaining sites according to the primary schedule as defined in the project *Scoping Study*.

The sites noted above with an asterisk (*) fulfill the requirements of both the Consent Decree and the District 7 Stipulation.



Status: The District 11 PS&E package was submitted to HQOE (step 2) on May 8, 1998, 3 days behind the original schedule of May 5, 1998. The projects were ready to list (RTL) on May 15, 1998, 4 days behind the original schedule of May 11, 1998. Delays to the original schedule are the result of changes to the plans arising from final review by District 11, and the time to make the changes by the Consultant. The decision point conference for this PS&E package was held with the Plaintiffs on June 11, 1998, one day behind the originally scheduled date of June 10, 1998. The District 11 PS&E package was formally advertised on June 22, 1998, coincident with the original schedule.

Design Report: A design report was completed for the District 11 PS&E package and forwarded to the Plaintiffs for review on June 1, 1998 in anticipation of the decision point conference on June 11, 1998. The Plaintiffs have subsequently reviewed design report and formally commented on June 17, 1998. In brief, the Plaintiffs comments relative to the design report are:

- More runoff could be treated at many sites
- More of the available land could be used at each site

Caltrans has agreed to augment the design report to provide additional documentation relative to the constraints and documentation that limit the amount of runoff that may be treated at each site and the constraints on the use of the available land. The design reports will be again reviewed by the Plaintiff once this additional documentation has been added.

Schedule: The District 11 PS&E projects (3 sites) are on schedule to begin construction on August 18th. The projects are scheduled to be completed by November 17th, in anticipation of the second decision point scheduled for November 18, 1998.

2.1.2 District 7 PS&E Packages

The District 7 PS&E package has been significantly modified since the March 30, 1998 Status Meeting. The original PS&E package content and the revisions are:

District 7, Project 1 - MW-C

This portion of the District 7 PSE package includes:

- Site 1 and Site 2: Trapping Catch Basin Pilots four sites, two control and two retrofit
- 2. Site 3: Infiltration Basin at I-605(NB) and SR 91 interchange

Caltrans has removed the Trapping Catch Basin Pilots from the PSE package to proceed as a procurement project due to scheduling problems and final Caltrans District 7 approval of the plans. This pilot project included retaining walls within the clear zone that required special design considerations. This PSE project will be comprised of the infiltration basin at the I-605/SR 91 interchange. Caltrans proposes to construct this infiltration basin according to the primary target schedule as defined in the



Scoping Study with the modifications noted herein.

District 7, Project 2 – BCC

This PSE package includes: Extended Detention Basin at I-605/I-5 interchange Extended Detention Basin at I-605(SB)/SR 91 interchange

The contents of this Project remain unchanged from the original (March 30th Status Meeting) schedule. Caltrans and the Plaintiffs agree to proceed with these Pilot Projects according to the primary schedule as defined in the *Scoping Study*.

Status: The District 7 PS&E package No. 1 was submitted to HQOE (step 2) on June 18, 1998, 35 calendar days behind the original schedule of May 13, 1998. The District 7 PS&E package No. 2 was submitted to HQOE (step 2) on June 22, 1998, 39 calendar days behind the original schedule of May 13, 1998. The projects were ready to list (RTL) on June ___, 1998, ___ days behind the original schedule of May 18, 1998. Delays to the original schedule are the result of changes to the plans arising from final review by District 7 and the time required for the Consultants to correct the plans. The decision point conference for this PS&E package was held with the Plaintiffs on June 11, 1998, one day behind the originally scheduled date of June 10, 1998. The District 7 PS&E packages will be formally advertised on July __, 1998, __ calendar days behind the original schedule. It was agreed by Caltrans and the Plaintiffs during the June 11, 1998 decision point conference that both District 7 PS&E packages would proceed to construction with the modifications as noted.

Design Report: A design report was completed for each PS&E package and forwarded to the Plaintiffs for review on June 1, 1998 in anticipation of the decision point conference on June 11, 1998. The Plaintiffs have subsequently reviewed design report and formally commented on June 17, 1998. The Plaintiffs comments relative to the design report are the same as those discussed in paragraph 2.1.1, and will be incorporated into the reports. The revised reports will again be reviewed by the Plaintiffs.

Schedule: The District 7 PS&E package No. 1 (1 site) is scheduled to begin construction on September 18th. The projects are scheduled to be completed by November 17th, in anticipation of the second decision point scheduled for November 18, 1998.

2.2 Procurement Design Packages

Three procurement design packages have been developed, two in District 7 and one in District 11 respectively. Each of the procurement packages has been submitted to the local Caltrans District for review through the encroachment permit process. The encroachment permit process is a mechanism Caltrans uses to allow other agencies and private entities to construct improvements within State right-



of-way. The plan review procedure is similar to that for PS&E projects within the District, however, the contracting and bidding process does not occur through Caltrans Headquarters.

Once the local District has issued an encroachment permit, the permittee may initiate construction of the improvements. The general process for plan approval by the District, bidding and award of the Procurement packages is as follows:

Item	Timing
Step 1: Submit plans to District	1 day
Step 2: District review of plans	8 weeks
Step 3: Encroachment Permit Issued	1 week
Step 4: Consultant procures services of contractor	6 weeks
Step 5: Construction Begins	1 day

Each of the three procurement packages has received District review and approval (step 1 and 2), and has been issued an encroachment permit (step 3) (package 2 in Los Angeles is expected on June 30).

2.2.1 District 11 Procurement Package

The District 11 Procurement package has been modified since the March 30, 1998 Status Meeting as a result of the discussion during the June 22, 1998 decision point conference. The original procurement package content is:

Project 2

- 1. Site 1: Infiltration Trench Carlsbad Maintenance Station*
- 2. Site 2: Biofiltration Strip Carlsbad Maintenance Station*
- 3. Site 3: Biofiltration Swale SR 78 (eastbound) at Melrose Drive*
- 4. Site 4: Biofiltration Swale I-5 (southbound) at Palomar Airport Road*

Project 5

- 5. Site 1: Media Sand Filter Escondido Maintenance Station*
- 6. Site 2: Media Sand Filter I-5 (southbound) at SR 78 Park and Ride*
- 7. Site 3: Media Sand Filter I-5 (northbound) at La Costa Blvd. Park and Ride
- 8. Site 4: Compost Filter Kearny Mesa Maintenance Station*

It was agreed between Caltrans and the Plaintiffs that Project 2, sites 1, 2 and 3 will be constructed as shown on current drawings. Caltrans further agreed in the June 22nd decision point conference to provide additional information relative to flow velocity and average swale detention time for Site 3. Site 4 will be revised to extend the length of the biofiltration swale. A revised construction drawing will be prepared for review by the Plaintiffs. The sites noted above with an asterisk (*) fulfill the requirements of the Consent Decree and the Stipulation.



It was agreed between Caltrans and the Plaintiffs that Project 4, sites 1, 2, and 3 will be constructed as shown on the project drawings. Site 4 will be revised to include a presettlement/pretreatment chamber prior to the compost filters. A revised construction drawing will be prepared for review by the Plaintiffs.

Status: The District 11 procurement plan package was submitted to the District (step 1) on March 16, 1998, coincident with the original schedule. The projects were reviewed by the District and revised by the Consultant through June 15, 1998, 31 calendar days behind the original schedule of May 15, 1998. Delays to the original schedule are the result of changes to the plans arising from review by District 11, and the knowledge that the schedule contained float during this period. The decision point conference for this PS&E package was held with the Plaintiffs on June 22nd, 1998, two days behind the originally scheduled date of June 20, 1998 to accommodate personal schedules. The procurement package is currently in the bidding process. The remaining dates of interest are:

Bid packages delivered to pre-qualified bidders: June 25, 1998

• Pre-bid meeting: June 30, 1998

• Bid opening: July 21, 1998

Notice of award: July 30, 1998

• Construction Begins: August 12, 1998

Design Report: A design report was completed for the District 11 procurement package and forwarded to the Plaintiffs for review on June 10, 1998 in anticipation of the decision point conference on June 22, 1998. The Plaintiffs have not provided formal comments on the design report to date.

Schedule: The District 11 procurement projects (3 sites) are on schedule to begin construction on August 12th. The projects are scheduled to be completed by November 17th (68 working days) in anticipation of the second decision point scheduled for November 18, 1998.

2.2.2 District 7 Procurement Package (Project 3)

The District 7 Procurement package (Project 3) has been modified since the March 30, 1998 Status Meeting as a result of the discussion during the June 11, 1998 decision point conference for the PS&E packages. The original procurement package content is:

Project 3

- 9. Site 1: Infiltration Trench Altadena Maintenance Station
- 10. Site 2: Biofiltration Strip Altadena Maintenance Station
- 11. Site 3: Biofiltration Strip I-605 (northbound), south of SR 91 (westbound) conn
- 12. Site 4: Biofiltration Swale Cerritos Maintenance Station
- 13. Site 5: Biofiltration Swale I-605 (northbound) at SR 91 (westbound) conn
- 14. Site 6: Biofiltration Swale I-5 (southbound) at I-605 (southbound) conn
- 15. Site 7: Biofiltration Swale I-605 (southbound) between Carson St. and Del Amo Blvd.



- 16. Site 8: Drain Inlet Insert Foothill Maintenance Station
- 17. Site 9: Drain Inlet Insert Las Flores Maintenance Station
- 18. Site 10: Drain Inlet Insert Rosemead Maintenance Station
- 19. Site 11: Trapping Catch Basin I-210 (eastbound/westbound) west of Orcas Ave. and I-210 (westbound) east of Orcas Ave.
- 20. Site 12: Trapping Catch Basin I-210 (eastbound and westbound) east of Filmore St., I-210 (eastbound and westbound) east of Van Nuys Blvd.

The decision point for these procurement projects is coincident with the Status Meeting (No. 2) on July 14th. Sites that have been added to this procurement project are shown in italics. The trapping catch basin sites were deferred from the PS&E projects due to delays in plan review and revision as noted previously.

Status: The District 7 procurement plan package was submitted to the District (step 1) on April 8, 1998, coincident with the original schedule. The projects were reviewed by the District and revised by the Consultant through May 29, 1998 (step 2), meeting the original schedule. An encroachment permit was issued on June 19, 1998, 11 calendar days behind the original schedule of June 8, 1998. Delays to the original schedule are the result of changes to the plans arising from review by District 7, and the fact that the schedule contained float during this period. The procurement package is currently in the bidding process. The remaining dates of interest are:

Bid packages delivered to pre-qualified bidders: June 25, 1998

• Pre-bid meeting: June 30, 1998

• Bid opening: July 21, 1998

• Notice of award: July 30, 1998

• Construction Begins: August 12, 1998

Design Report: A design report was completed for the District 7 (project 3) procurement package and forwarded to the Plaintiffs for review on June 30, 1998 in anticipation of the decision point conference on July 14, 1998. The Plaintiffs have not provided formal comments on the design report.

Schedule: The District 7 procurement Project 3 (12 sites) are on schedule to begin construction on August 12th. The projects are scheduled to be completed by November 17th, in anticipation of the second decision point scheduled for November 18, 1998. Attainment of this schedule is predicated on a consensus to proceed between Caltrans and the Plaintiffs at the July 14th decision point conference.

2.2.3 District 7 Procurement Package (Project 4)

The District 7 Procurement package (Project 4) has been modified since the March 30, 1998 Status Meeting as a result of the discussions with the Plaintiffs. Three Multi-chambered Treatment Train (MCTT) devices have been substituted for four infiltration trench BMPs that were not sited.



Project 3

- 21. Site 1: Media Filter Eastern Region Maintenance Station
- 22. Site 2: Media Filter Foothill Maintenance Station
- 23. Site 3: Media Filter Termination Park and Ride
- 24. Site 4: Media Filter Paxton Park and Ride
- 25. Site 5: Oil/Water Separator Alameda Maintenance Station
- 26. Site 6: MCTT Lakewood Park and Ride
- 27. Site 7: MCTT Metro Maintenance Station
- 28. Site 8: MCTT Via Verde Park and Ride

The decision point for these procurement projects is coincident with the Status Meeting (No. 2) on July 14th. Sites that have been substituted to this procurement project are shown in italics. The MCTT pilot projects are in lieu of the infiltration trenches that were not sited due to siting constraints (lack of sites exhibiting suitable infiltration rates). Three oil/water separators were also not sited due to lack of sites investigated with high concentrations of free oil and grease. This issue was previously discussed at the March 30th status meeting.

Status: The District 7 procurement plan package was submitted to the District (step 1) on April 8, 1998, coincident with the original schedule. The projects were reviewed by the District and revised by the Consultant through June 25, 1998 (step 2), 30 calendar days beyond the original schedule. Delay was due primarily to the substitution of MCTT devices for infiltration trenches. An expert in the design of MCTT devices, Dr. Robert Pitt, was consulted during the siting and design process. Dr. Pitt will remain as a technical consultant for the MCTT devices through the life of the pilot study. An encroachment permit is anticipated to be issued on June 30, 1998, 22 calendar days behind the original schedule of June 8, 1998. Delays to the original schedule are the result of the issues mentioned previously, and the fact that the schedule contained float during this period.

Bid packages delivered to pre-qualified bidders: July 6, 1998

Pre-bid meeting: July 13, 1998
Bid opening: August 10, 1998
Notice of award: August 17, 1998

• Construction Begins: August 19, 1998

Design Report: A design report was completed for the District 7 (project 3) procurement package and forwarded to the Plaintiffs for review on June 30, 1998 in anticipation of the decision point conference on July 14, 1998. The Plaintiffs have not provided formal comments on the design report to date.

Schedule: The District 7 procurement Project 4 (8 sites) is on schedule to begin construction on August 19th. The project is scheduled to be completed by November 17th, in anticipation of the second decision point scheduled for November 18, 1998. Attainment of this schedule is predicated on a consensus to proceed between Caltrans and the Plaintiffs at the July 14th decision point conference.



2.3 Cost Estimates

2.3.1 District 7 Stipulation

Cost estimates for the BMP Pilot Projects required as a part of the District 7 Stipulation were originally computed when the Stipulation was signed. The construction cost of the District 7 program was estimated at that time to be about \$3,120,000. Since then, the District 7 program has undergone the changes indicated above, and more refined estimates have been completed. The Table 1 at the end of this Section provides a site by site comparison of costs from the preliminary stage (at execution of the Stipulation) and the Engineer's estimates, completed as a part of the development of the construction plans.

The Engineer's estimate for the 3 PS&E and 19 Procurement sites in District 7 is \$7,055,000. This represents an increase of about 125% as compared to the preliminary estimate. There are several reasons for the cost increase. First, the preliminary estimate was based on conceptual data with no specific site information. It is common that as projects become refined and specific details are defined, costs may be more accurately projected, and generally increase. The primary cost increases have been for the BMPs that are constructed of cast-in-place concrete. These projects include the media filters and the MCTT units. In some cases, these units are deeper than originally anticipated to accommodate hydraulic requirements, with increases in cost due to structural considerations and the requirement for pumping in some instances. The MCTT units appear to be substantially more costly to construct than the infiltration trenches they replace. Currently a capital cost ratio of 1 MCTT unit to two infiltration trenches is estimated. The cost for concrete lining in one of the extended detention basins was also not contemplated for the preliminary estimate. This cost is not large compared to the total improvement costs however, at about \$23,000 in District 7, and \$185,000 for the stipulation site in District 11.

2.3.2 District 11 Consent Decree

Capital costs for the BMP Pilot Projects required as a part of the District 11 Consent Decree have been estimated based on the unit costs prepared for the District 7 Stipulation. The construction cost of the District 11 program is estimated (using preliminary unit costs developed for the Stipulation) to be about \$2,060,000. This cost includes the sites described in the District 11 Composite Siting Study. Two of the sites described in the Siting Study have been delayed for 1-year (Project 1, Site 2 and Project 4, Site 1). The estimated cost (preliminary) without the two delayed sites is \$1,567,000. The Table 2 at the end of this Section provides a site by site comparison of costs from the preliminary stage (at execution of the Stipulation) and the Engineer's estimates, completed as a part of the development of the construction plans.

The Engineer's estimate for the 3 PS&E (current) and 7 Procurement sites in District 11 is \$2,863,800. This represents an increase of about 87% as compared to the preliminary estimate. There are several



reasons for the cost increase. First, the preliminary estimate was based on conceptual data with no specific site information. It is common that as projects become refined and specific details are defined, costs increase. The primary cost increases have been for the BMPs that are constructed of cast-in-place concrete. These projects include the media filters. In some cases, these units are deeper than originally anticipated to accommodate hydraulic requirements, with increases in cost due to structural considerations. Further, one of the units was designed as a below ground vault which increases costs as compared to an at-grade structure. The cost for concrete lining in one of the extended detention basins was also not contemplated for the preliminary estimate. This cost is not large compared to the total improvement costs however, at about \$185,000. The entire cost for the District 11 program, including the two delayed sites and the concrete lining at two sites is estimated to be \$3,384,200.

2.4 Design Problems and Solutions

Numerous design-level issues were resolved during the process of plan preparation and review. In general, the most significant issues were as follows:

- Application of water quality design criteria
- Maximize the use of available land
- Maximize the quantity of water treated at each site
- Constraints of downstream storm drain systems
- Site ingress/egress

Discussion of specific issues for each site relative to the items listed above is provided in the project Design Reports. The Design Reports serve to document the design process, design decisions, and opportunities and constraints encountered during the development of the construction drawings.

Specific comments were also made by the Plaintiffs on the construction drawings. Caltrans responded to the comments and where mutually agreed, incorporated these comments into the construction drawings. The Plaintiff comments on the drawings for the PS&E and procurement packages, as well as Caltrans' responses are contained in Appendix ____.

2.4.1 Application of Water Quality Design Criteria

The projects were designed according to the criteria established in the Scoping Study and the design documents referenced therein. Most of the design issues relative to the application of water quality criteria involved the extended detention basins, biofiltration swales and biofiltration strips.

Extended Detention Basin The Scoping Study indicated a minimum length to width ratio of 3:1 with an average detention time of 24 hours. It was noted that some locations would allow a greater length to width ratio, or that this ratio could be enhanced through the use of flow baffles in the basin. The final

10



designs generally had length to width ratios that exceed the specified minimum. Another issue was the use of forebays. For the applications in the Pilot Program, it was generally agreed that the use of forebays was optional, however adequate inlet energy dissipation is mandatory. Inlet dissipation was generally accomplished with the use of riprap.

Biofiltration Swales and Strips The key criteria in the design of biofiltration swales and strips is the average residence time, the flow velocity and the flow depth. Some of the retrofit sites provided the opportunity to increase average residence time above the specified minimum of 5 minutes. The designs were generally revised to take advantage of these opportunities. Flow velocities were kept at or below 1 fps in most cases and flow depths generally did not exceed 4 inches, as specified in the Scoping Study

2.4.2 Use of Land, Quantity of Runoff Treated and Downstream System Constraints

In many locations, there was sufficient land area available to treat additional runoff, or expand the proposed facility to treat the tributary runoff more effectively. These issues were reviewed on a site-by-site basis and are discussed in detail in the project Design Reports.

In general, the designs were developed with idea of using the available space to its maximum effectiveness within the constraints of a pilot program. Caltrans storm drain systems are currently laid out in a highly segmented fashion, with individual watersheds typically ranging from 1 to 10 acres. Redirecting additional flow to retrofit sites may be problematic for several reasons. First, altering the existing freeway system can be a complex and costly undertaking. Caltrans does not allow 'open cutting' of freeway mainline or ramps, consequently, storm drain systems must be jacked under existing roadways. Jacking operations include the construction of a jacking pit, receiving pit and the installation of a jacked conduit. Jacking operations are relatively expensive, beginning at about \$1000 per meter.

Secondly, most Caltrans storm drain systems tie into municipal storm drain systems at the Caltrans right-of-way. Municipal storm drain systems are master planned to accept the tributary area and land use that they serve. It is generally impractical to divert additional storm water runoff to a municipal system without first increasing the capacity of the system. This constraint must be investigated on a case-by-case basis however through a detailed hydrology and hydraulic analysis of the municipal system, or, a review of the original design information if it is available.

2.4.3 Site Ingress and Egress

Access to the site was also an important design consideration. Maintenance vehicles must be able to safely exit the freeway/highway and return. Vehicle turn-around requires a minimum of 50' by 50' and in most cases the best solution is to provide a maintenance road around the entire structure (in the case of basins) to facilitate maintenance of the side slopes and vehicle turn-around.

The surface of the maintenance road was selected as AC to provide all weather access to safely



accommodate all types of vehicles. Crushed, compacted aggregate base may be a suitable alternative for facilities that will be restricted to truck and maintenance vehicle traffic. Crushed aggregate base would also reduce the amount of impervious area as compared to AC and is more inexpensive to construct.



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ב ב ב ב	2000		
	MW - PS&E	Infiltration Basın	
		Site 3: Infiltration Basin	I-605 NB/SR 91 WB Connector
			PROJECT 1 SUBTOTALS
2	B&C . PS&E	Extended Detention Basins	
		Site 1 Extended Detention Basin	I-5/I-605 Interchange, between I-5 SB and
	1000		
		Site 2: Extended Detention Basin	1-605/SR 91 Interchange, between 1-605 SB and
			PROJECT 2 SUBTOTALS
m	MW - Procurement	Infiltration Trench, Biofilters, and Catchbasin Inserts	
		Site 1 Infiltration Trench	Altadena Maintenance Station
		Site 2: Biofiltration Strip	Altadena Maintenance Station
		Site 3. Biofiliration Strip	Coup NB, South of SX 91 W B Connector
A		Site 4 Biofiltration Swale	Cerritos Maintenance Station
	***************************************	Site 5: Biofilitation Swale	I F CD I FOR CD OWNER
		Site 7. Biofiltration Swale	1-805 SB helween Carson St and Del Amo Blvd
		Site 8: Catchbasin Inserts	
A SECURE OF THE PROPERTY OF THE PARTY OF THE		Site 9. Catchbasin Inserts	Las Flores Maintenance Station
		Site 10: Catchbasin Inserts	Rosemead Maintenance Station
5			PROJECT 3 SUBTOTALS
	B&C - Procurement	Media Filters, Oil/Water Separator, MCTTs	
		Site 1 Media Filter	Eastern Regional Maintenance Station
		Site 2: Media Filter	Foothill Maintenance Station
***************************************		Site 3: Media Filter	Term mation Park & Ride (1-105/1-605 interchange)
		Site 4: Media Filter	Paxton Park & Ride (1-210/SR118)
		Site 5: Oil/Water Separator	Alameda Maintenance Station
		Site 6: I MCTT (substitution for infiltration trench)	Lakewood Park & Ride (1.5 & Lakewood)
		Site7: I MCTT (substitution for infiltration trench)	Metro Maintenance Station
		Site 8: I MCTT (substitution for infiltration trench)	Via Verde Park & Ride (1-210 & Via Verde)
	The state of the s	O il/W ater Separator	nnsited
		O il/W ater Separator	nnskled
11 7/14		O il/W ater Separator	Unsiled DDO IEST A SIBTOTALS
1.4	MW - Procurement	Trapping Catchbasins and Infiltration Basin	
	1	Site 1 Trapping Catchbasins	1-210 E&W, west of Orcas Ave.
			1-210 W, east of Orcas Ave.
		Site 2: Trapping Catchbasins	1-210 E&W, east of Filmore St.
			1-210 E&W, east of Van Nuys Blvd.
		The state of the s	
			TO TAL District 7, Sites
			TOTAL District 7 Sites (no concrete lining)
SD	RBR - P886	Detention Basin (substitution for infiltration basin)	I-15/SR78 Interchange
	AEI - Procurement	Biofillration Swale	1-5 SB at Palomar Airport Road
	AEI - Procurement	In filtration Trench	Carlsbad Maintenance Station
	AEI - Procurement	Biofiltration Strip	Carlsbad Maintenance Station
	AEI - Procurement	Biofiltration Swale	SR 78 EB at Meirose Place
	RBF. PS&E	Inflitration Basın	I-5 SB at La Costa Blvd.
	AEI - Procurement	Media Sand Filter	Escondido Maintenance Station
	AEI - Procurement	Media Sand Filter	I-5 SB/SK /8 Park & Ride
***************************************	AEI.Procurement	Compost Filter (substitution for infiltration (rendit)	San Diego Sites
		mante del proprieta del propri	San Diago Sites (no concrete lining)
			Market Colored (1981) Street Colored (1981)
			TOTAL STIPULATION



Stip List of Extended Detention Basis And Buildings Estimates Cost X Site 1: Extended Detention Basis H-15/R778 interchange \$	Program) Stipulation Site			Preliminary
Estimate	× × × × × × × ×		ŏ	ost
Substitute Basin Biofiler	* * * * * *		Esti	mate
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3.0 OPERATION, MAINTENANCE, AND MONITORING PLANS

Operation, Maintenance, and Monitoring (OM&M) Plans are required to comply with the Scoping Studies written for each District. The function of the OM&M Plans is to ensure that the BMPs are maintained to the state-of-the-art level of operation, that water quality and related data are collected to evaluate the performance of the BMPs, and to gather empirical data that will aid in the future design and deployment of similar stormwater BMPs. The OM&M plans are being prepared in two volumes. Volume I is a guidance document for the preparation of Site-Specific OM&M plans. Volume I can be used for this project as well as future projects where stormwater BMPs are deployed. Volume II is a site specific set of plans for each of the BMP sites. Volume II has the potential for use on future BMP sites. A project kick-off meeting was held on May 1, 1998.

3.1 Volume I - Guidance Document

Preparation of Volume I and II began with the preparation of document outlines (table of contents) for each Volume. Volume I required a two outlines - one for District 7 and one for District 11. The reason for this is that each District is governed by different court documents and different Regional Water Quality Control Boards. Otherwise, the documents are the same. The draft outlines were presented to NRDC and the Consultants for their review on May 15, 1998. The outlines were revised to include comments. NRDC accepted the outlines on June 22, 1998.

<u>Status:</u> Volume I being prepared by RBF and it is about 85 percent complete. OM&M Plans for both Districts are proceeding in parallel and are on schedule at this time. Editing of partially complete documents happens as the document are being prepared.

Schedule: Preparation of Volume I documents began on May 18, 1998. A draft of the Volume I's is scheduled to be ready for Caltrans Review on July 17. A 100 percent draft is scheduled for NRDC review on August 13. Approximately 15 days (three weeks) is allocated for this first review. Revisions and a subsequent review is scheduled. Volume I documents are scheduled to be complete and published on October 12, 1998.

3.2 Volume II - Site Specific Plans.

Preparation of Volume II documents for District 11 was scheduled to begin on June 8. One Consultant was tasked with preparing a model site-specific plan to be used for all of the BMP sites. A draft of the model plan was completed on June 19 and distributed to the consultants preparing plans. The plan was reviewed by the Consultants and a Mid-Course meeting was held on July 1. The meeting helped to clarify the scope and nature of the site-specific plans Volume II plans are to be prepared generally by the design consultants. Commencement of preparation of the site-specific plans was scheduled for June 22.

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Schedule: Preparation of Volume II documents for District 11 began on June 8. A draft of Volume II is scheduled for Caltrans review on July 23. Plaintiff reviews are scheduled to start on August 12. Again, three weeks is scheduled for Plaintiff review. The final documents are scheduled to be available for implementation on October 26.

Volume II documents for District 7 began on June 22. A draft of Volume II is scheduled for Caltrans review on August 7 Plaintiff reviews are scheduled to start on September 2. Again, three weeks is scheduled for Plaintiff review. The final documents are scheduled to be available for implementation on November 30.

4.0 VECTOR CONTROL ACTIVITIES

Mosquitoes and vector control are concerns for Southern California metropolitan areas because the climate is amenable for a large portion of the year to mosquitoes and the diseases they can transmit. Biting flies such as mosquitoes are important vectors of disease to humans and domesticated animals. Approximately eighteen viruses are known to be transmitted by biting flies to humans and other mammals in California; eight of the viruses have been shown to cause febrile and central nervous system illnesses in humans. The rapid increase in population and the addition of new sources of standing water into a historically dry region creates the potential for disease transmission by mosquitoes. Consequently the Scoping Studies have provided for background monitoring for mosquitoes and midges. Cockroach and vertebrate vector background studies may be required as well. The background studies will establish baseline populations and their characteristics prior to implementing the BMPs. They can also help in determining the need and magnitude for ongoing vector monitoring during the two year pilot program.

The implications of an increasing vector population has peaked the interest of the local Vector Control Districts. Consequently, they have requested that they be the primary operator regarding abatement of mosquitoes and midges. Development of a Memorandum of Understanding is needed to gain and guide their participation during the pilot study period.

4.1 Background Vector (Mosquito/Midge) Monitoring

<u>Status</u>: Formal plans were prepared for the Vector Control Background Monitoring Plan (Mosquitoes and Midges) and distributed to all stakeholders in the vector control aspects of the pilot studies on July 1, 1998. The plans present the detailed objectives and methods for completing the study.

Preliminary preparations for the Background Monitoring began in May. Prepurchases and leases of equipment began and are continuing. Visits to all the BMP sites was performed by the study team in mid-June to determine trap locations and other logistical needs. Actual trap placement and monitoring is



planned to start in early July. Monitoring will continue through construction through December 1998.

Schedule: The Background Monitoring program will be carried out from June 1998 through December 1998 by personnel under the supervision of Dr. William Walton, Department of Entomology, University of California, Riverside.

A report summarizing the abundance and composition of host-seeking adult mosquitoes and midges collected at the BMP sites from the period of June 1998 to December 1998 will be forwarded to Caltrans by January 8, 1999. Data analysis and the writing of the final report will be carried out by Dr. Walton.

4.2 Memorandum of Understanding with Vector Control Districts

As noted earlier the Vector Control Districts are anticipated to be a member of the maintenance and monitoring team. To clearly describe the VCD role, responsibility, and financial relationship to the team, a draft Memorandum of Understanding (MOU) was prepared and submitted to the VCDs for comment. A draft of the MOU is presented in an appendix to this report.

4.3 Vector Control District Liaison

Understanding of the need for vector control monitoring and abatement is critical to the success of the Retrofit Pilot Study Program. The VCDs have a significant public health protection role and enforcement capability. Their role and capabilities are such that they have similarly powers to water quality regulatory agencies. They can even issue cease and desist orders.

As a result liaison with the VCDs began in March 1998. Several meetings were held and they have participated in the development of the outlines for the OM&M plans. The Mosquito and Vector Control Association of California passed a resolution recognizing the potential that the BMPs have for creating a breeding habitat for mosquitoes and requesting to have significant involvement by the local VCDs. The liaison efforts have helped in development draft MOU for VCD participation in the project. A copy of the MVCAC resolution is presented in Appendix D of this report.

5.0 JURISDICTIONAL ISSUES

In order to implement all of the objectives of the BMP Retrofit Pilot Program and develop reliable data, it is critical that Caltrans be able to maintain the proposed BMP sites on a regular basis during the life of the program. Specifically, Caltrans is concerned that if a n agreement between them and regulatory agencies is not established and an agency takes jurisdiction over a BMP site, should it begin to exhibit wetland characteristics, the objectives of the program will be compromised. Therefore, Caltrans intends to establish a MOU between themselves and the following agencies: Army Corps of Engineers (ACOE);



United States Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA); Regional Water Quality Control Boards (RWQCB); and the California Department of Fish and Game. The intent of the MOU is to allow Caltrans to operate and maintain each BMP site without any restrictions on these activities during the time in which the BMP Pilot Program is active.

A draft MOU was prepared a presented to Caltrans on June 19, 1998.

6.0 BIOFILTER PLANT MIXTURE RESEARCH

During the design period of the biofilter BMPs it was found that an optimal plant mix was needed to ensure optimal performance of the BMP. Additionally, the BMPs are expected to be put into operation immediately after construction. The biofilter performance is dependent on the plants in the in the biofilter. Consequently, it is necessary for the plants to be established and functional immediately after construction. A research program was implemented to determine the optimal seed mixture and deployment strategy for immediate efficacy of the biofilter BMPs.

In April 1998, Martha Blane and Associates was hired to evaluate the proposed seed mixture for the biofilters. Martha Blane's charter was develop a plant mix that met the following criteria:

- Filter suspended solids within runoff from paved areas;
- Withstand one-year storm events;
- Adapt to climate conditions within Caltrans Districts 7 and 11;
- Tolerate periods of both high and low moisture:
- Be low growing; and,
- Require little or no maintenance.

A seed/plant mixture was developed for the biofilters. However, the mix was relatively slow to develop.

The concept of sodding the seed mixture was considered. Several difficulties were identified that suggested little or no success. Research continued and a strategy was developed. A sod mixture could be developed. The base grass mixture is winter rye grass with the recommended native seeds and plants mixed in. The winter rye would provide for immediate performance of the BMP and allow the native seeds and plant to germinate and become well established. At the end of the season, the winter rye grass would die and leave the native plants to continue the BMP performance.

The Martha Blane report and follow on reports are presented in Appendix E.



7.0 SCHEDULE AND CALENDAR STATUS

Caltrans has agreed to provide detailed project schedule to be published as a part of each status meeting. The detailed project schedule incorporates all of the significant dates and milestones for completing the work described in the Scoping Studies. Those detailed schedules were distributed as part of the revised scoping studies in May and June 1998. An updated summary schedule is provided in Appendix H of this report. The schedule reflects the delays in the design projects and in implementing the construction schedule. The summary also reflects the recently developed schedules for the OM&M Plans and Vector Control activities.

In addition to the detailed schedule, Caltrans has agreed to publish a calendar which shows meetings, milestones, and other activities. The calendar is intended to provide all participants with a quick reference as to when and where activities are happening and to allow for optimizing personal schedules. The most recent calendar is presented in Appendix G.

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APPENDIX A

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ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

April 29, 1998

RBF JN 34123

Dr. Richard Horner 230 N.W. 55th Street Seattle Washington 98107

Subject: NRDC Review Comments on District 7 PS&E Projects 1 and 2

Dear Dr. Horner:

We have received the comments you submitted on behalf of the plaintiffs dated April 22, 1998 relative to the Los Angeles (District 7) BMP Retrofit Pilot Program. Your review covered both Montgomery Watson's Project #1 and Brown and Caldwell's Project #2. The responses were prepared by Montgomery Watson (MW) and Brown and Caldwell (BC), peer reviewed and finalized by Robert Bein, William Frost and Associates (RBF). Final review and authorization for distribution was performed by Caltrans.

This letter integrates both Brown & Caldwell's and Montgomery Watson's responses into a single document. For the sake of clarity, your original comment is stated first, including your original headings, followed by the teams response in italics. We feel that a face-to-face meeting with you to discuss these comments is important. Accordingly, we are available to discuss the comments and responses at our April 30 meeting at District 7 offices.

Your original comments and our responses are as follows:

CONCLUSION OF REVIEW

We do not approve the trapping catch basin (TCB) designs, because the retrofit TCB sets and the control sets to which they will be compared are not matched closely in flow quantities or contributing catchment areas. In both control/retrofit pairs the larger flow would be directed to the retrofit set of basins. This design introduces a potentially crucial bias to the study, because the treatment ability of the retrofitted trapping catch basin sets would be compromised by their relatively greater flow throughput than the paired control set having an equivalent (or nearly equivalent) number of self-cleaning drain inlets.

Response: After extensive research of CDM's inventory of Caltrans highway drainage systems, several drainage system possibilities were selected for further analysis. As documented in the Caltrans BMP Retrofit Pilot Program, Composite Siting Study, District 7, the four systems included in the current design were by far the most suitable for this study. Furthermore, these sites were mutually agreed upon by Caltrans and NRDC prior to their

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final acceptance. Understandably, the tributary areas were estimated at the time of the Siting Study, and were therefore subject to change following a detailed survey.

In regard to the concern that the larger flow would be directed to the retrofit site in both pairs, there was an error in the flow quantities and tributary area values that were reported in the design summaries. The values for the first pair of sites (Locations 1 and 2) are reversed, with Location 1 (West of Orcas Ave.) having a tributary area of 3.4 acres and Location 2 (East of Orcas Ave.) having a tributary area of 1.1 acres. Therefore, the larger flow will be directed to the control site in this pair. The second pair of sites are correctly reported, although the site originally recommended to be the retrofit site is now designated as the control site (please refer to the section "Comments on Trapping Catch Basins" for further explanation). Apart from this, neither the Scoping Study nor the Siting Study specified that the larger flow must be directed to the control site.

We do not approve the extended-detention and infiltration designs in their present form on the following grounds:

1. They exploit only a fraction of the full potential for improvements in water quality by not utilizing much of the area available.

Response: The area within the cloverleaf is necessary for safety as a recovery zone to comply with Caltrans safety requirements. Flooding of the Caltrans Cerritos Maintenance Station is a severe constraint on the construction of the Infiltration Basin at the I-605N/SR91W site. Flooding of the maintenance station yard occurs at an elevation of 19.96m. As currently designed the, the water level in the infiltration basin will reach 19.91m elevation during a 25 year runoff event (6 inches of rainfall). This provides a freeboard of 0.05m or a0pproximately 2 inches, not a comfortable margin. In general, this site provides very little head loss to accommodate adequate drainage. Stormwater runoff enters the site at 19.70m elevation and exits at 19.55m, allowing approximately 6 inches of fall.

2. They reduce potential water quality improvement by not being designed at state-of-the-art levels.

Response: The basin has been designed to state-of-the-art levels. The criteria in the Scoping Study were used for the site, and conservative design assumptions were made for the site.

The unapproved designs are inconsistent with paragraph 1.A of the District 7 Stipulation stating that, "These devices shall be designed, ... at state-of-the-art levels."

We first amplify our objections to the trapping catch basin designs. In the next series of comments we elaborate on our general objections to the extended-detention and infiltration basin designs relative to the two points above and indicate what we will require for approval. These remarks will be followed by specific comments on details of the individual designs.

COMMENTS ON TRAPPING CATCH BASINS

The reason to conduct a retrofit pilot study of trapping catch basins is to determine if they collect and retain substantially more solids than the "self-cleaning" drain inlets that are now the Caltrans standard. A fair test of two alternative systems that, whether by design or incidentally, collect solids would be to subject both to the same hydraulic loading rate. In the study designed, though, the two catchments to be retrofitted with TCBs will have peak runoff rates 275 and 146 percent, respectively, higher than their paired control catchments. This situation has resulted primarily from two deviations from the Composite Siting Study: (1) the catchment area of the site on I-210 west of Orcas Avenue is much smaller than the slightly over 3 acres expected at the time of siting; and (2) the Composite Siting Study recommended that the I-210 site east of Van Nuys Boulevard be made the control in its pair, but it was designated as the retrofit site instead.

Response: (1) Given the error reported in the design summaries, it is actually the catchment area of the I-210 site East of Orcas Avenue which was underestimated during the siting process (1.1 acres actual vs. 2.5 acres estimated). Therefore, the first catchment to be retrofitted with TCBs will have 1 year, 24 hours event peak runoff rates 69 percent lower than its paired control catchment.

(2) The site located East of Van Nuys Boulevard that was initially thought to be appropriate for control was found to be better suited for retrofit due to site constraints at its pair location (East of Fillmore). As was presented in the Composite Siting Study, the site at I-210 East of Fillmore Street has a drain inlet located on the median between the eastbound I-210 and the northbound SR 118 / eastbound 1-210 connector. This location has traffic on both sides and would be an unsafe location for personnel during monitoring and maintenance. It was considered safer to have all retrofitted drain inlets located along the shoulder. For this reason, it was determined that it would be more appropriate to designate this site as the control site, and not monitor the accumulation of sedimentation in this one drain inlet.

The non-grate drain inlet located on the adjacent slope at the site East of Van Nuys Blvd. will not interfere with the monitoring results since the sampling locations were selected to specifically exclude the runoff entering the system from this off-site inlet (see plan sheets D-4 and D-5).

We will not proceed with such a biased set up and insist that the hydraulic loading rates within the pairings be made as close as highway configurations allow. The general ways of reconciling the deviations would be to find one or more new sites, to repipe so that more water goes to the control drain inlets and/or less to the retrofit TCBs, to enlarge the TCBs in order to reduce the unit hydraulic loading rate, or a combination of the last two measures. We have some objection to enlarging the TCBs, because we believe they are sized correctly for the subcatchment areas each serves, and the flows produced, according to prevailing practice; enlargement would increase their cost and lower cost effectiveness. We will have to

wait to see what options additional analysis produces before making a final judgment on that point.

Response: The design as currently proposed ensures that the study will not be biased in either way since the larger flow would be directed to the retrofit site in one pair and to the control site in the other pair.

GENERAL COMMENTS ON EXTENDED-DETENTION AND INFILTRATION BASIN DESIGNS

1. The Retrofit Pilot Projects exist to examine how best to improve the quality of runoff discharged from Caltrans facilities as a basis for decision making regarding larger scale implementation. These projects, as in any pilot study, must be executed according to the same philosophies and procedures that would apply to full implementation. It is highly inconsistent with these tenets not to seek the greatest benefit (here, water quality improvement) allowed by the prevailing circumstances, but ignoring opportunity to increase benefit is exactly what these designs do. Improving runoff water quality entails subjecting as much runoff as possible to treatment, exploiting the opportunities presented to provide treatment to the maximum within the limits imposed by actual constraints, and using the best available techniques to provide treatment. These designs fail in all three aspects (see points 2, 3, and 4, respectively).

Response: See response to specific points below.

2. A project attempting to maximize benefit would treat as much stormwater as feasible, and the prospects for doing so must be analyzed. In both of these cases it appears that runoff from more right-of-way area could be collected and delivered for treatment, and land is available for additional basin capacity:

At I-5/I605S, runoff could be collected from the I-5 southbound lanes, the I605S/I5S connector, and the box culvert draining the existing 600mm RCP.

At I605/SR91, potential additional runoff sources are the 91E, I-605S connector, the I-605S/91W connector, and the existing 600-mm RCP at the northeast corner.

We recognize that redirecting these runoff streams to the basins would entail piping modifications and additional piping, both increasing cost, However, as is pointed out in later comments, we believe that some aspects are over-designed to no water quality or other real advantage, and thus offer a source of cost savings. We understand that some or all of these possibilities have already been analyzed and rejected on cost grounds. We request the results of those analyses.

We also recognize that collecting more drainage would create the likely need to introduce influent at more than one point, an impediment to monitoring and another additional expense if multiple inlets are instrumented. However, we have not demanded that all inflows and

outflows be monitored; in fact, we have emphasized other means of judging performance. While monitoring would increase information, it does not yield a full picture of performance because of the inability to monitor all flow. Therefore, it is better to monitor some facilities of a given type more intensively than to monitor all with less coverage. In these circumstances we can not see sacrificing the main goal (learning how best to gain the most water quality benefit) to an imperfect means to that end and a secondary consideration.

Response: Pilots are conceived and designed as 'inline' facilities and major changes to the existing Caltrans drainage system are not within the scope of the project.

I-5/I-605 Site

- a) Runoff from I-5 southbound lanes does not currently drain through the site. Collection would require increasing the size of the downstream collection system and revision of the drainage system on the freeway.
- b) It is not possible to collect runoff from the existing 600 mm RCP drain, treat the flow in a detention basin and discharge to the to the existing 1.8 m x 0.9 m RCB outlet. The hydraulics would require pumping since the flowline is lower than the proposed detention facility. The pipe in question has a low slope profile and is connected to the low end of the site. Backing water up in the pipe would flood upstream areas and drainage basins.
- c) Collection of runoff from the 605S/I-5S connector would require revision of the drainage of the current connector. A significant amount of grading could also be needed to provide positive drainage to the basin and would increase the amount of flow through the existing 1.8 $m \times 0.9 m$ RCB outlet.

I-605/SR 91 Site

- a) Runoff from the 91E/I-605S connector does not currently drain through the site. Collection would require increasing the size of the downstream collection system and revision of the drainage system on the freeway.
- b) It is not possible to collect runoff from the existing 600 mm RCP inlet drain and maintain positive discharge to the outlet drain. The flow passes through the low end of the site and would not discharge to the existing outlet if it were treated in the detention basin. The flowline would have to be raised by reinstalling the pipe by jacking under the freeway.
- c) Collection of runoff from the 91E/605N connector would require installation of a pipe jacked underneath the connector based on the side slope of the connector draining away from the basin.
- 3. A project attempting to maximize benefit would exploit all of the space that could be used to advantage, and the best allocation of the available space must be analyzed. Both of the sites in which these basins are set have more room than is proposed for use by the designs. This space could be used to treat more runoff (point 2); treat the

same amount of runoff more effectively, especially by reducing the tendency toward short circuiting; or both.

Response: The sites currently use the space needed to capture and treat the design water volume. The basin volume was sized by capturing the entire runoff volume and releasing it over an extended period. As indicated above, redirecting additional flow to the sites is precluded. The length to width ratio at each site meets or exceeds the criteria stated in the Scoping Study. Additionally, considering the small orifices at the effluent portion of the basin and the 1-year design storm basis, the basins will basically function as fill and draw treatment facilities. Short-circuiting is not expected to be a problem.

4. The designs fall short of state-of-the-art levels in these respects:

Available land is not devoted to lowering the potential for flow short circuiting by dividing the basins into two or more distinct cells, with water constrained to flow from one to the other at a point.

Available land is not used to increase the flow path length between the inlet and outlet as much as practicable. The flow path can be lengthened not only by simply elongating a linear basin, but also by gradually expanding from the inlet and contracting toward the outlet, creating a serpentine form, and constructing peninsulas and islands as flow barriers.

Available space is not given to obtaining the needed volume by reducing depth and increasing water surface area, both of which have positive influences on pollutant removal efficiencies.

The basins do not have forebays, which are recognized as greatly advantageous to maintenance by concentrating the majority of the deposited sediment volume in one place. Furthermore, a forebay assists in reducing flow short circuiting to the benefit of treatment by decreasing inlet velocity and distributing flow across the basin.

Please note that the Federal Highway Administration's Evaluation and Management of Highway Runoff Water Quality (FHWA Manual), which was cited as a basis for these designs and is a state-of-the-art reference, emphasizes these features (see, for example, page 201). They must be considered and incorporated into the design in the optimal manner unless site constraints interfere.

Response:

a) Sequential multiple cells as described do not generally decrease short-circuiting in continuous flow basins but rather create sequential short-circuiting. These basins are designed to fill and release slowly in a "batch" type process and are not expected to have short-circuiting problems.

- b) see response above (a).
- c) It should be noted that minimum depths for detention basins are given in several publications. A minimum depth is important to preclude resuspension of particulates. The design target depth for the basins was from 2 to 4 feet deep, consistent with published minimum depth guidelines. As indicated previously, the design volumes are conservative, as are the design drain times. Although shallower depths in sedimentation basins can theoretically improve the particle removal efficiencies, there is a very practical problem associated with shallow depths. This problem is the resuspension of previously accumulated material. Resuspension can occur during the first flush of subsequent storm events or can be the result wind and waves creating turbulence near the bottom of the basin. Consequently, determination of the "optimum" depth is a function of balancing deposition against resuspension. The literature does not offer much in the way of definitive guidance on this issue.

Young et al. (1996) have no recommendation for minimum depth; however, they specify a maximum depth based on safety factors of 1.2 m.

Dorman et al (1996) specify a minimum depth of 2 feet to prevent resuspension.

d) Basin forebays are noted in literature as a device to assist in maintenance only. They are an optional part of design if they would not be beneficial for maintenance on these projects. Given that the subject basins serve primarily impervious areas and given their relatively small size, forebays are not considered advantageous. They are not shown in the Scoping Study, nor are they given prominent discussion in the FHWA publication. Further, in the publication, "Operation, Maintenance and Management for Stormwater Management Systems", (USEPA, 1997) it is noted that forebays are provided solely to [facilitate maintenance](pg. 7-7). The subject basins will be given high levels of maintenance and forebays are not considered advantageous.

Young et al. (1996) do not include a forebay in the basic design elements or in any of their schematic drawings. They also give no guidance on depth, size or other design criteria. It is only mentioned in one location as a feature that can facilitate sediment removal from the pond.

There have been no published reports that indicate that sediment forebays improve the pollutant removal efficiency of detention ponds. Further, the sudden expansion of flow from the inlet pipe to the pond system, when locally protected by riprap will provide good velocity reduction and distribution of flow given the long design drain time.

5. Constructing entirely of concrete serves no good purpose, has drawbacks, and is a poor use of available funds that could better go to improving treatment. The reason that has been stated verbally for the concrete designs is to study maintenance with and without concrete. However, maintenance should be concentrated primarily near the inlet by

providing a forebay. It is entirely appropriate and a good practice to place concrete on the bed of the forebay. With a forebay, sediment removal from elsewhere in the basin should be a very infrequent necessity and not warranting concrete. Sidewall erosion can be prevented with gradual side slopes (preferably 4:1 or slighter, for which space is available) and stabilization with vegetation. Vegetation may have to be reestablished and woody growth removed during maintenance. None of these factors require study; they are well known. Thus, the second reason for constructing with concrete is invalid.

Concrete has the drawback of disallowing pollutant interaction with vegetation and the soil, which takes away some pollutant removal mechanisms. With lack of any advantage, impediment to treatment, and wastefulness of funds, concrete construction should be specified only for some overriding reason. There is no such reason visible in either of these cases. If convincing reasons can not be produced to use concrete, then the basins must be earthen as far as we are concerned.

Response: The concrete basin lining serves to effectively aid in maintaining the larger basins. Vegetation growth in an un-lined basin will require extensive maintenance, and will result in vector control problems. Caltrans anticipates vegetation removal on a quarterly basis to ensure wetland type plant species do not establish, and that vector control problems do not arise. The use of lining then, is specified for ease of long-term maintenance. Since this is an experimental program, the basin at one site is lined and the basin at the other site is unlined. The differences can be observed.

6. It appears that paved maintenance access roads are to be built around the entire basin perimeter in the case of the I-605/Sr 91 basin and all along one side of the other basin. With a forebay, completely surrounding the basins is an unnecessary expense. The FHWA Manual, in fact, recommends access only to the forebay and outlet (page 202). We object to conventional asphalt paving because of its unnecessary impervious surface and cost. The FHWA Manual specifies a solid driving surface but names materials other than impermeable ones. Paving blocks that allow vegetation growth and water penetration would be a good choice. We will agree with the proposed "gold-plated" maintenance access only if cost is not used as a reason to discard provisions that improve treatment.

Response: Access to the basin is required for vector control, maintenance of the basin side slopes and invert, and for mobility of the vehicles. All types of vehicles will require access to the sites during the study and during all kinds of weather conditions. Asphalt paving is the most effective material for this type of all weather maintenance/monitoring access. Asphalt paving and concrete are the only realistic options because of the road slope and the potential size of maintenance vehicles. Asphalt paving will be less expensive than concrete paving.

Pavers will be substituted if desired, however, be advised that we estimate they would cost much more than asphalt (on a per square foot basis). The labor necessary to install pavers is very intensive. Further, maintenance would be increased to control vegetation in the area of the pavers.

7. A project attempting to maximize benefit and gain acceptance if implemented on a large scale would be structured to minimize objections that might be raised by the public. The public may very well object to features that are designed with no consideration of appearance whatever, as these facilities are. Although appearance may be less important along a highway than in a neighborhood, current design philosophy is to make as good an appearance as possible without detracting from more fundamental objectives. Fortunately, good appearance is generally consistent with good water quality performance. Irregular geometry such as recommended above, generally fitting with the site contours, and using vegetation instead of concrete are all conducive to performance as well as appearance. We will not countenance these projects being designed in a way that risks public disapproval unless there are overriding reasons for doing so. As none are apparent, they must be redone to make a better appearance.

Response: The Extended Detention Basins are located in depressions between highway connectors that are elevated on the sides of the sites. Both basins were designed out of public view and certainly not intended to distract motorists traveling at a high speed. The purpose of the pilot studies is to construct BMP facilities. The designs accommodate the land features and attempt to preserve areas with established trees.

8. To summarize what is needed for our approval, these sites must be reanalyzed to allocate the available land in the optimal way to maximize the water quality benefits considering: (1) how much runoff can feasiblely be collected for treatment, (2) multicelled arrangements, (3) increasing flow path lengths, and (4) decreasing depths for given volume and thereby increasing water surface areas. The basins must have forebays and be of earthen construction instead of concrete, unless a convincing argument can be made for concrete. Appearance designed to maximize public acceptance must be incorporated in the designs.

Response: The Extended Detention Basins follow state-of-the-art design guidelines and are appropriate for the two sites. The runoff to the site has been maximized based on upstream and downstream hydraulic restraints. The runoff will certainly serve the pilot program and has not unnecessarily increased the project cost by rebuilding intersections. Multi-celled basins can have some operational advantages for maintenance but do not improve treatment. The length to width ratios are adequate and short-circuiting is not an important concern in a fill and release basin. The depths of the basins are at a minimum level as currently designed. One basin is concrete lined and one is not; an appropriate design for an experimental program. The appropriate designs for these two sites do not include any additional aesthetic

concern. Acceptance will be accomplished with minimum inconvenience to the driving public.

Infiltration Basin

This design has the same types of faults as the extended-detention basins, as follows:

1. It misses runoff that might be treated, does not make the best use of available space, and is not entirely consistent with state-of-the-art design standards (see points 2, 3, and 4, respectively).

Response: The basin was designed to capture the first flush (one year, 24 hour event) for the tributary drainage area and sized accordingly. The hydraulic characteristics of the site allow for the design flow to be treated while excess flows follow the existing flow routing. Otherwise, the basin meets the state-of-the-art Design Guidance (Young et al, 1996) contained in the scoping study.

2. It appears that additional drainage could be routed from a drain inlet just off the I-605 mainline on the cloverleaf ramp. Also, bypass could be more restricted from the catch basin where the maintenance base drainage enters, with that water redirected to the infiltration basin. We recognize the same issues surrounding adding runoff as explored above and have the same feelings about them expressed there.

Response: The expense and impracticality of conveying the runoff from the downdrain at the I-605 cloverleaf ramp to the infiltration basin resulted in our decision to allow this runoff to exit the site in a normal fashion. Possible flooding of the maintenance yard was a further consideration.

3. There is additional space that could be used to treat more runoff (point 2), reduce the risk of failure as an infiltration device (see point 4), or both.

Response: The basin was sized to capture the one year, 24 hour storm event.

4. The design provides no pretreatment, which is a state-of-the-art recommendation and could be provided as a presettlement basin in the space available. Minimizing sediment loading is especially important with the relatively low infiltration rate at this site. Also because of the relatively slow rate, it would be best to improve infiltration quantity by exposing water more directly to the soil by designing an even shallower, more expansive basin. The space allocation must be reconsidered in light of these points.

Response: Pretreatment is provided by an energy dissipation device as recommended in the Design Guidance (Young et al, 1996) in the Scoping Study. Furthermore, the majority of the runoff being treated is from impervious areas, and a portion of the runoff receives pretreatment from a Biofiltration Swale (included in the Procurement Package).

The depth of water in the basin at the end of runoff will be 9 inches, fairly shallow in our opinion, and not conducive to operation of a sediment forebay.

5. The same comments on maintenance access road and appearance stated for the two extended-detention ponds also apply to this site.

Response: Access around the entire basin is required for vector control, maintenance of the basin side slopes and invert, and for mobility of the vehicles (to avoid backing up into offramps/freeway mainline). Referencing the Planning & Design Staff Guide, access should consist of "a permanent area to be provided around the perimeter of the impoundment to allow maintenance." All types of vehicles will require access to the sites during the study and during all kinds of weather conditions. Asphalt paving is the most effective material for this type of maintenance/monitoring access.

Pavers will be substituted if desired, however, be advised that we estimate they would cost between 3 to 4 times as much asphalt (on a per square foot basis). The labor necessary to install pavers is very intensive. Further, maintenance would be increased to control vegetation in the area of the pavers.

SPECIFIC COMMENTS ON I-5/I-605S EXTENDED-DETENTION BASIN

1. The 30-foot "clear zone," to which we have never agreed and for which we have received no new rational, is overly constraining the use of this site. We cannot move ahead on these designs with this criterion unresolved..

Response: The 30-foot zone is designed into the slope of the site and is not important to the design or the location of the basin at this particular site.

2. There was no attempt to re-engineer the inlet box culvert to improve the elevation differential with the basin outlet, in order to prevent backwater at higher inflows.

Response: The backwater were investigated and found to not impact the flooding of the source drainage areas. Re-engineering means jacking a new pipe under the freeway for little or no benefit.

3. The plans do not clearly indicate that a stabilized overflow spillway with an energy dissipater is part of the design. Not providing for controlled release of water volumes larger than the basin is designed to treat can result in a large amount of erosion or failure. These specifications must be added.

Response: The overflow from the basin is through box "c" and follows the original drainage of the site. Rock slope protection will be added to that location to prevent erosion failure.

4. Full details for the outlet and bypass swales are missing. We particularly want to see the specifications for energy dissipation (e.g., check dams) and vegetation.

Response: The existing sheet flow drainage has not been significantly modified. As indicated in 3, rock slope protection will be added at the overflow point.

5. Landscaping must be fully specified if this basin becomes earthen instead of concrete.

Response: Noted, hydroseeding is specified and could be incorporated if the difference between lined and unlined basins is not piloted.

6. We do not see a reason for a flap gate on the outlet pipe and request an explanation.

Response: The flap gate allows sufficient depth of flow for monitoring.

7. The side slope is 2:1 on the east side of the basin, an excessively steep grade that may result in erosion and must be reduced if the basin is earthen. The slope seems to result from not designing with the shape and contours of the space, but instead needlessly forcing a regular geometry in an irregular site, as well as from needlessly constraining clear zone.

Response: The site is concrete for the reasons described above and not earthen.

SPECIFIC COMMENTS ON I-605/SR 91 EXTENDED-DETENTION BASIN

1. The side slope is 2:1 on the east side of the basin, an excessively steep grade that may result in erosion and must be reduced if concrete can not be justified. Again, the reason seems to be failure to design with the landscape, forcing a rectangular basin in a triangular area.

Response: The geotechnical report on the soil conditions at this particular site indicates that 2:1 slopes are acceptable. Currently the site slope is in excess of 2:1 with no signs of erosion.

2. Inflow energy dissipation is inadequate and must be provided to reduce the tendency toward flow short circuiting.

Response: This is a fill and release basin and a basin with an adequate length to width ratio. Short-circuiting is not a concern.

3. The overflow spillway here appears to be smooth concrete without energy dissipation. It also appears to discharge across the access road and then enters a swale whose design is not specified. The spillway must be roughened and energy dissipation added at the bottom to prevent erosion. Discharging high flow over a road is poor design,

possibly coinciding with a time when access is needed; this feature must be redesigned. Complete specifications of the outlet swale must be given.

Response: The overflow is wide enough to have very low overflow velocities. However, the spillway will be made rough. The road will not be compromised by the very low depth of flow. The swale is the existing sheet flow area.

4. Landscaping must be fully specified if this basin becomes earthen instead of concrete.

Response: The hydroseeding is specified in the project specifications.

SPECIFIC COMMENTS ON I-605/SR 91 INFILTRATION BASIN

1. We think that the intended mode of operation of this basin, allowing flows in excess of design to over-top into an encircling smooth concrete swale, is very strange and inimical to good performance. We recommend that the facility be designed as an off-line device, where excess flow is routed around it. The intended operation risks considerable wear on the sidewalls and resuspension of trapped sediments. The convergence of flow moving rapidly through the smooth concrete swale risks additional erosion downstream.

Response: With so little head loss available across this site, rapid flow will not present a problem. The disposal of water to avoid flooding of the Cerritos Maintenance Station will be a bigger problem. After the one year, 24 hour storm is captured, the excess flows will generally be directed to the outlet. We do not see resuspension of sediment trapped in the basin to be a problem.

2. It is very important to detail the construction of an infiltration basin, which the plans do not do. Poor construction techniques can ruin a surface for infiltration by compaction and other effects. These specifications must be made clear and complete. RBF was sent references that detail these points, in particular a course manual titled Infiltration Facilities for Stormwater Quality Control that has a list of 13 construction recommendations on pages 33 and 34.

Response: These specifications will be reviewed and incorporated into the design package.

3. Landscaping must be fully specified.

Response: Landscaping will consist of a hydroseed application to stabilize slopes. It is Caltrans policy to replace only existing landscaping that is disturbed during construction.

4. A valved backup underdrain should be provide per the FHWA Manual.

Response: The 2-3/4 inches of fall available from the floor of the basin to the outfall precludes

providing a backup underdrain.

SPECIFIC COMMENTS ON TRAPPING CATCH BASINS

1. Plan sheet D-13 is missing from both sets sent to us.

Response: The sheet will be faxed and an original will be brought to our April 30 meeting.

2. We recognize that Caltrans routinely builds drainage networks with drain inlets (DIs) in series. Extending this practice to networks of trapping catch basins is inconsistent with their intended function of retaining solids until cleaning. Nevertheless, we have not objected to it, because we recognize the infeasibility of reversing the practice in any widespread retrofitting that could come out of the pilot program. Therefore, we must see how the TCBs perform relative to the traditional drain inlets in this kind of service. We did check to be sure that retrofit sets are burdened by no more inlets in the series than their paired self-cleaning sets. Locations 1 and 2 are equivalent in this respect.

Locations 3 and 4 appear not to be equivalent, but lack of consistency and clarity in the plans clouds whether they are or not. For Location 3, plan sheet L-3 shows <u>four</u> DIs in the westbound lanes, with a single DI and a pair in series each draining to the fourth one. That same DI also takes drainage from one DI in the eastbound or connector lanes. However, the accompanying information summary, as well as the Composite Siting Report, refer to <u>five</u> westbound and one median (between connector and eastbound mainline) DI. Are there four or five westbound DIs? Also, the plan seems to indicate a pipe exiting from the connector or eastbound DI. Does that pipe exist and, if so, will it be capped or removed?

Response: Location 3 does include five (5) drain inlets located along the Westbound shoulder as indicated in the Composite Siting Report and Information Summary Sheet - the layout sheet was in error and has been corrected. The pipe appearing to exit from the eastbound DI is actually flowing into the DI, and is the discharge from the DI located along the Eastbound shoulder (which is not shown on the plan). The DI shown at the bottom of the plan is the DI located on the median. A layout is attached to clarify this arrangement.

Location 4, paired as the retrofit with Location 3, appears to have two westbound TCBs draining into a third, which discharges to a TCB in the eastbound lanes. That TCB also seems to get flow from a series of three other TCBs in the eastbound lanes. If those impressions are correct, this one TCB takes flow from the entire 3.7 acres, which would surely compromise its solids retention performance. We have questions about other aspects of this location:

Response: The existing drainage system does operate as you have described. However, this is no different than the existing functionality of Location 3, which was originally designated as the retrofit site. In Location 3, six drain inlets eventually discharge into one DI located along the

Response to Comments D7 PS&E Projects 1 and 2 April 29, 1998 Page 15

Westbound shoulder. Therefore, designating Location 4 as the retrofit has not compromised the study. In addition, all retrofitted drain inlets will be checked every two weeks during the monitoring phase, which will provide ample opportunity to ensure that the final downstream DI will perform as designed.

Plan sheet D-5 shows a sampling point for the three westbound TCBs in series, while D-4 indicates a sampling point following the eastbound TCB getting the total flow of the catchment. Are we reading the plans correctly? If so, what is the monitoring philosophy here?

Response: The monitoring scheme on the Eastbound shoulder does function as you have described. However, the monitoring on the Westbound shoulder takes place upstream of the DI which receives the flow from the Westbound side, and therefore only monitors the performance of the Eastbound retrofitted TCBs.

Is there a median inlet present now and, if so, what will happen to it with the retrofit?

Response: The median inlet is in Location 3, not Location 4. The existence of this median inlet was the determining factor in proposing Location 4 as the retrofit site instead of Location 3. Please refer to our response given in the section "Comments on Trapping Catch Basins" for further explanantion.

What will happen to the inlet labeled (m) on plan sheet D-5? It is shown to be deleted but still connected to the system. It looks like some water could bypass that inlet; is that true?

Response: The drain inlet labeled (m) will be sealed to prevent runoff from entering it from the roadway. However, it will not be removed because it is necessary to conduct the runoff from the Westbound side to the Eastbound side.

What will happen to the DI downstream of the eastbound sampling point? Is it deleted, does it remain but is disconnected, or is it still in full service?

Response: The DI located downstream of the eastbound sampling point is drain inlet (m). See response above.

It would be extremely helpful to get simple line diagrams of the system at each location with the answers to these questions.

Response: A set of line diagrams will be faxed and originals will be brought to our April 30 meeting.

Response to Comments D7 PS&E Projects 1 and 2 April 29, 1998 Page 16

FINAL COMMENTS

We are aware that our failure to approve three of the designs risks delaying their completion past this year, although we hope that issues can be resolved and necessary changes made in time to keep them on schedule. However, it is more important to us that the facilities be given every chance to succeed as treatment devices that is allowed by current knowledge, the sites, and the budget. Thus, we are unwilling to approve designs that we do not believe meet that standard for the sake of schedule.

It appears to us that the extended-detention and infiltration basins projects were approached more as standard highway designs than environmental control developments using today's design criteria and methods. In our last set of comments we questioned if this is because of the experience of the designers or the restraints by Caltrans against applying the precepts of state-of-the-art stormwater treatment facility design. Replication of a very similar design philosophy by a different set of designers suggests that constraints are being placed on the design team by the client. For whatever reason, unacceptable designs are being produced, greatly inhibiting progress.

Response: Our recommendations are based on a number of studies and we have developed the design guidelines based on the factors that appear to have the most impact on basin performance. Consequently, we believe that the proposed retrofit designs qualify as state-of-the art. The goal of this research is to establish the benefit of a suite of BMPs for use by Caltrans. Given that we have agreed on standard designs citing current literature for evaluation, the costs, benefits and feasibility of these structures are clearly established for potential broad base application. Our efforts have been guided by a noted expert in the field of stormwater quality management, Dr. Michael Barrett.

Respectfully,

ROBERT BEIN, WILLIAM FROST & ASSOCIATES

William R. Whittenberg, P.E., DEE

WRWhittenberg

Task Order Manager

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cc Mr.Christopher May, NRDC

Mr. Jeremy Johnstone, USEPA Region 9

Mr. David Beckman, NRDC

Mr. Terry Tamminen, Santa Monica BayKeeper

Mr. Ken Moser, San Diego BayKeeper

Mr. Steven Borroum, Caltrans

Ms. Yulya Davidova, Caltrans

Mr. Scott Taylor, RBF

Mr. Steven Boroum, Caltrans

Mr. B. Finn, Brown & Caldwell

Mr. Gary Freidman, Montgomery Watson

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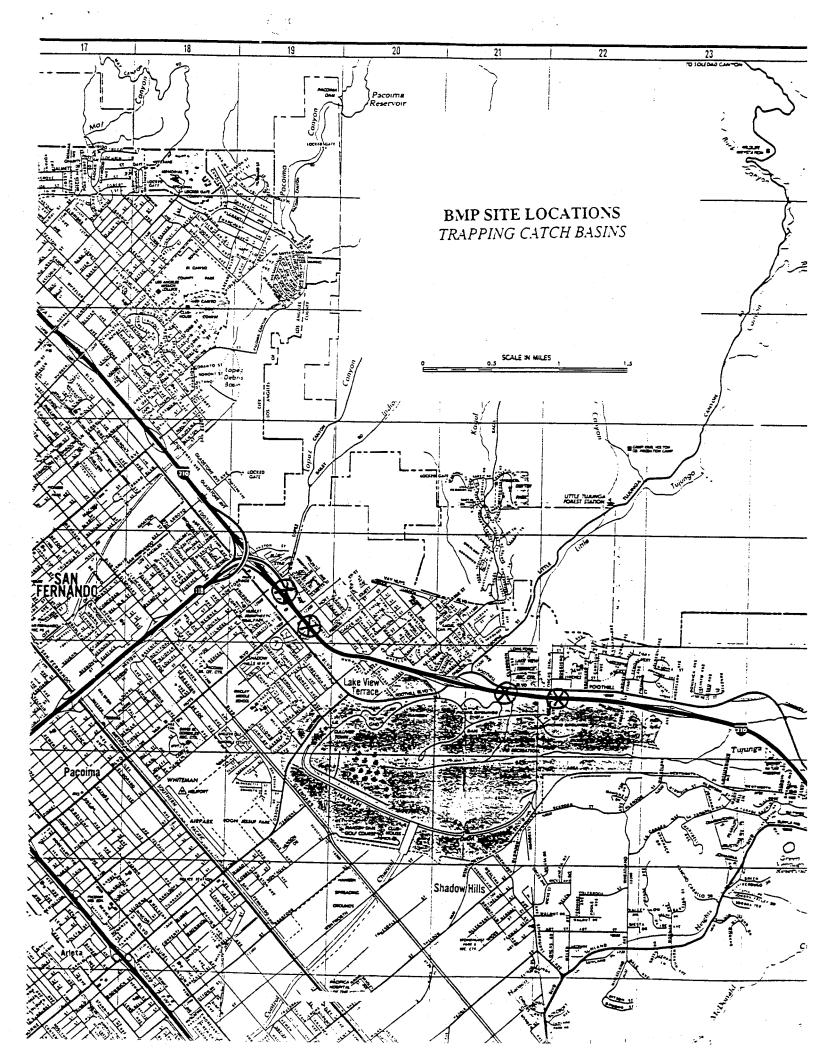
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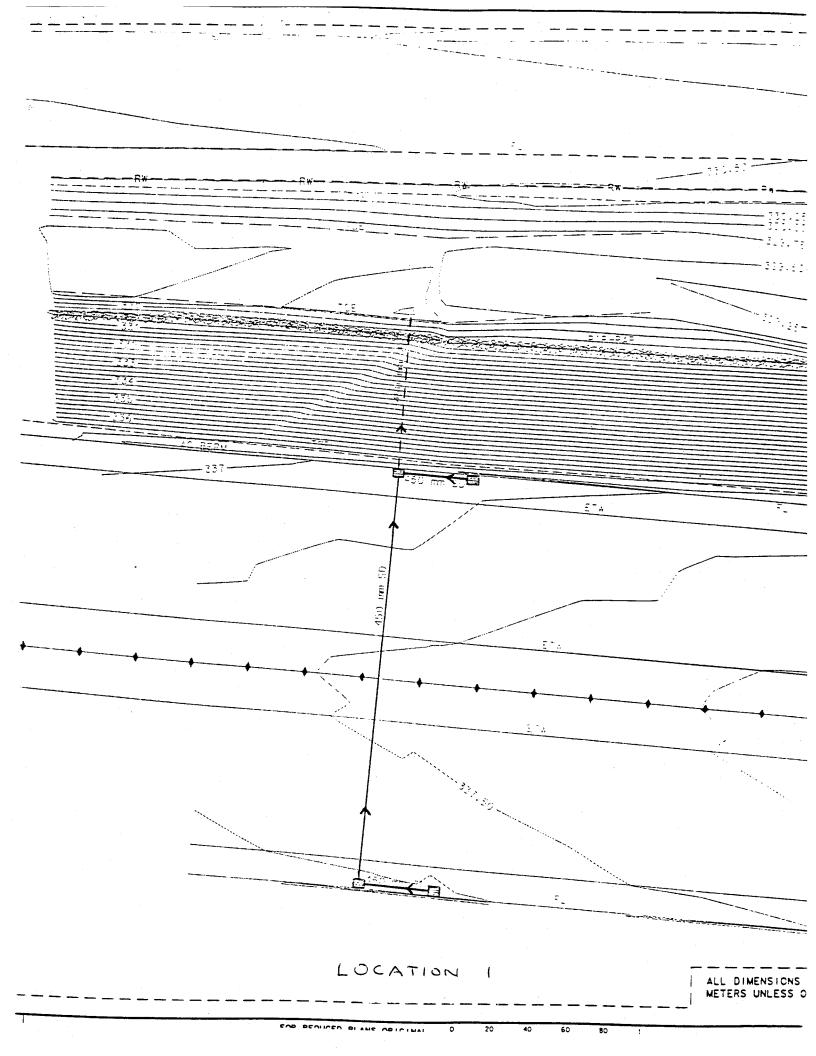
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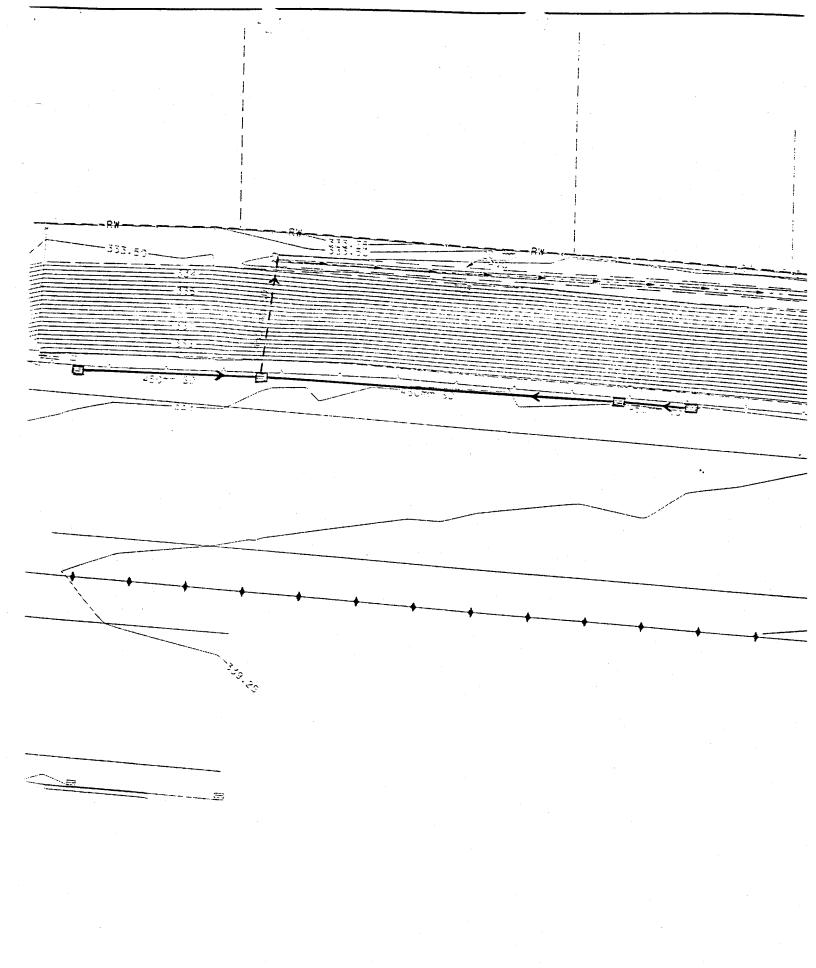
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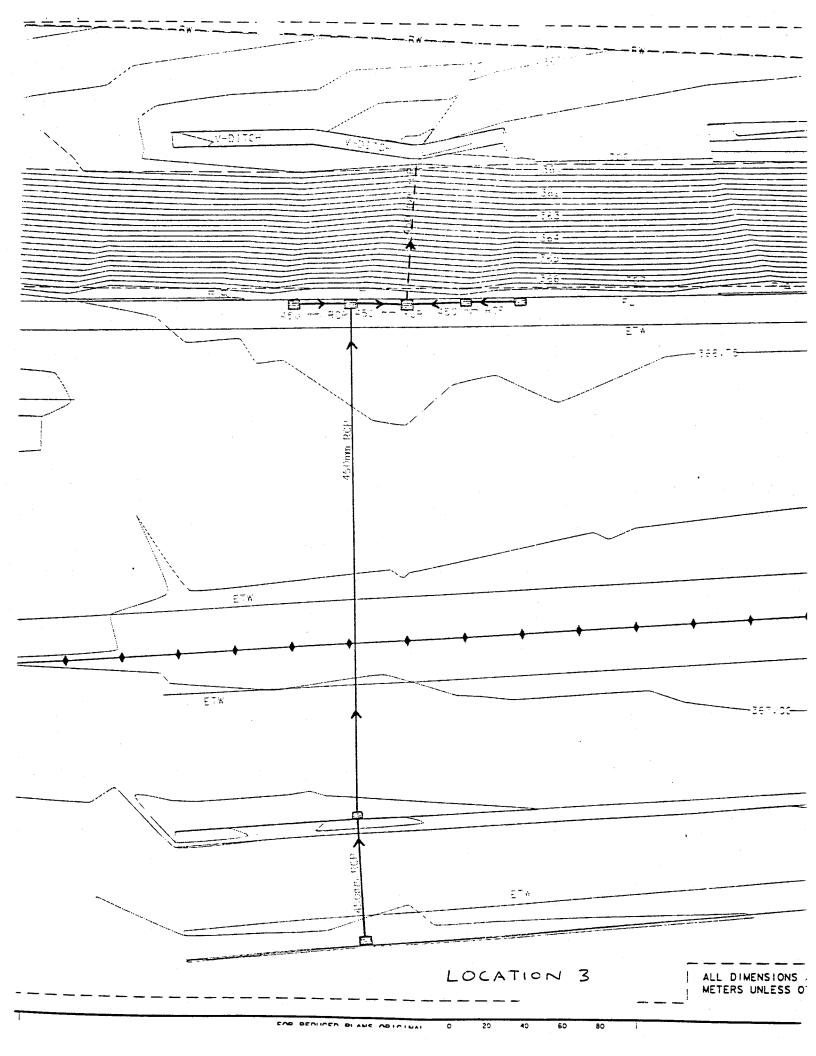


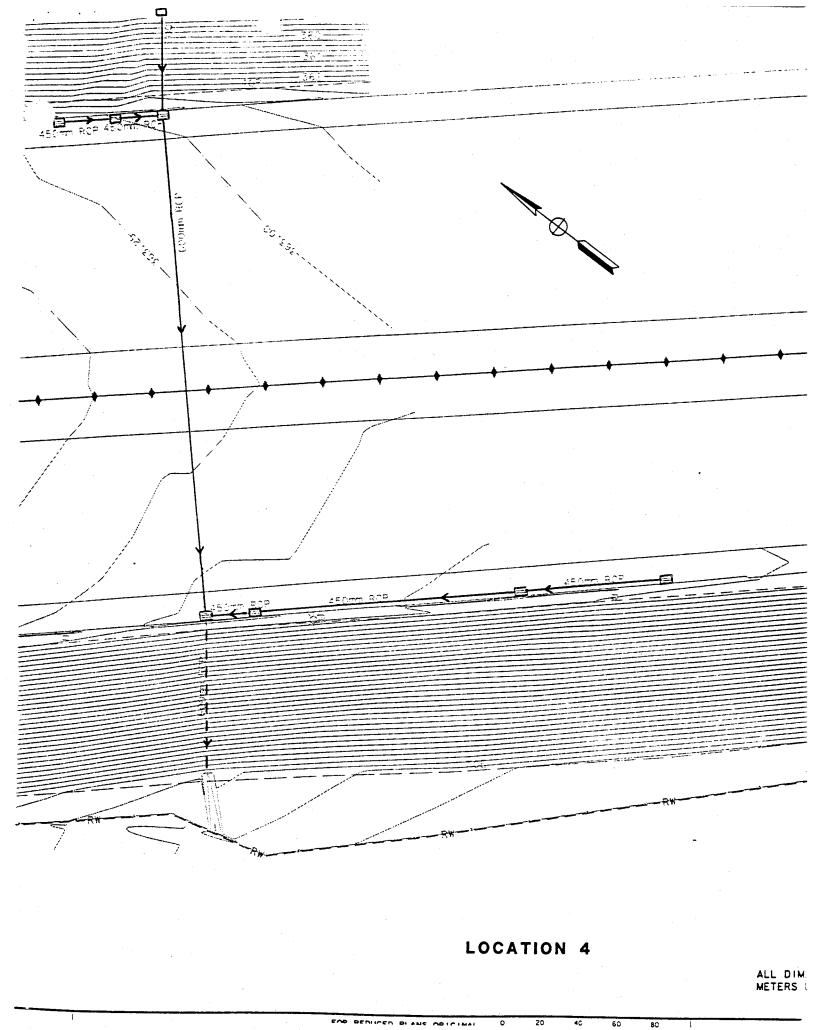


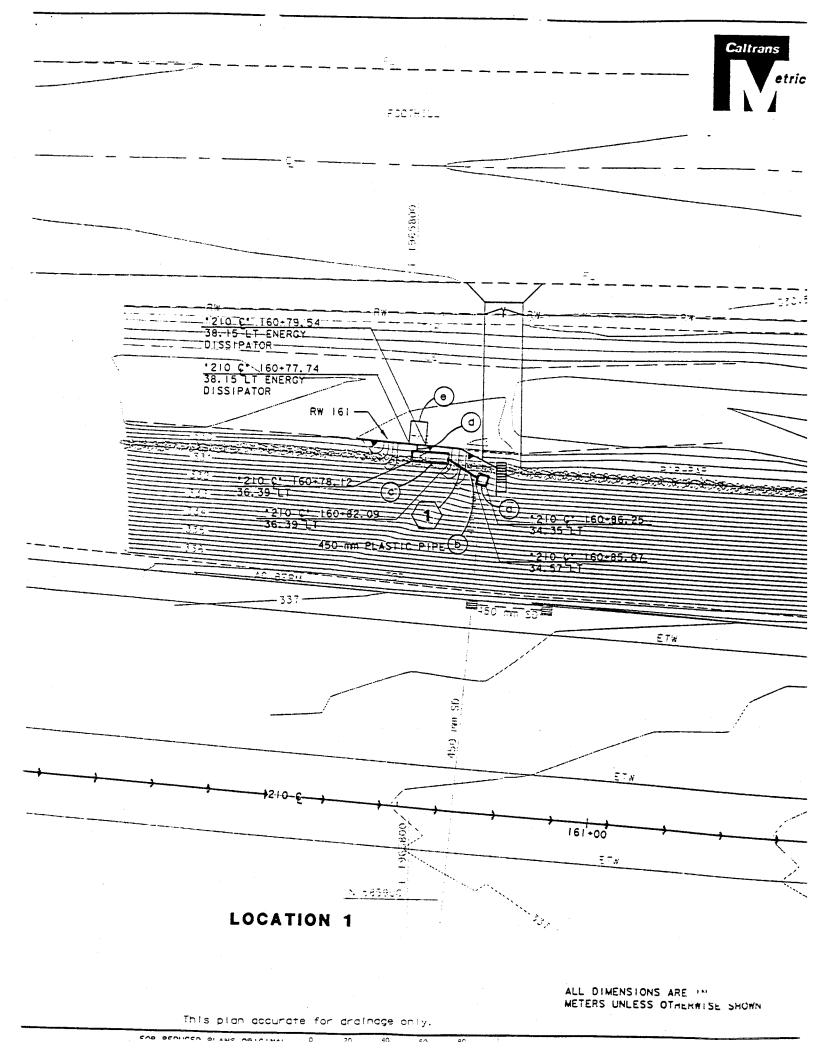


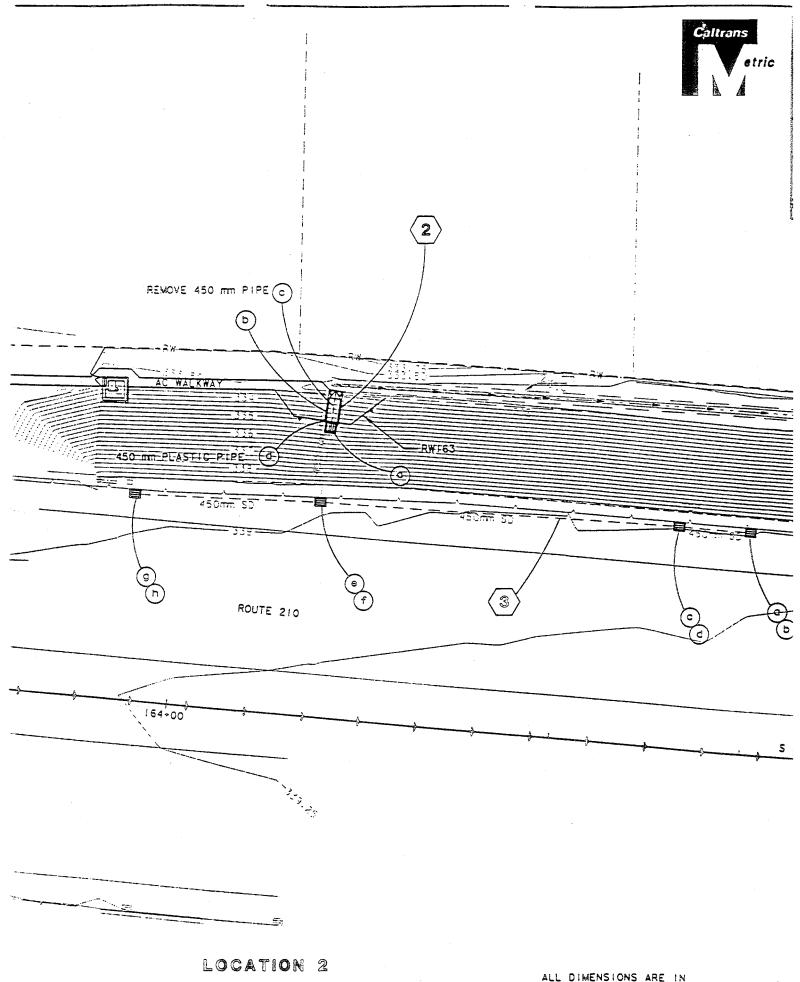
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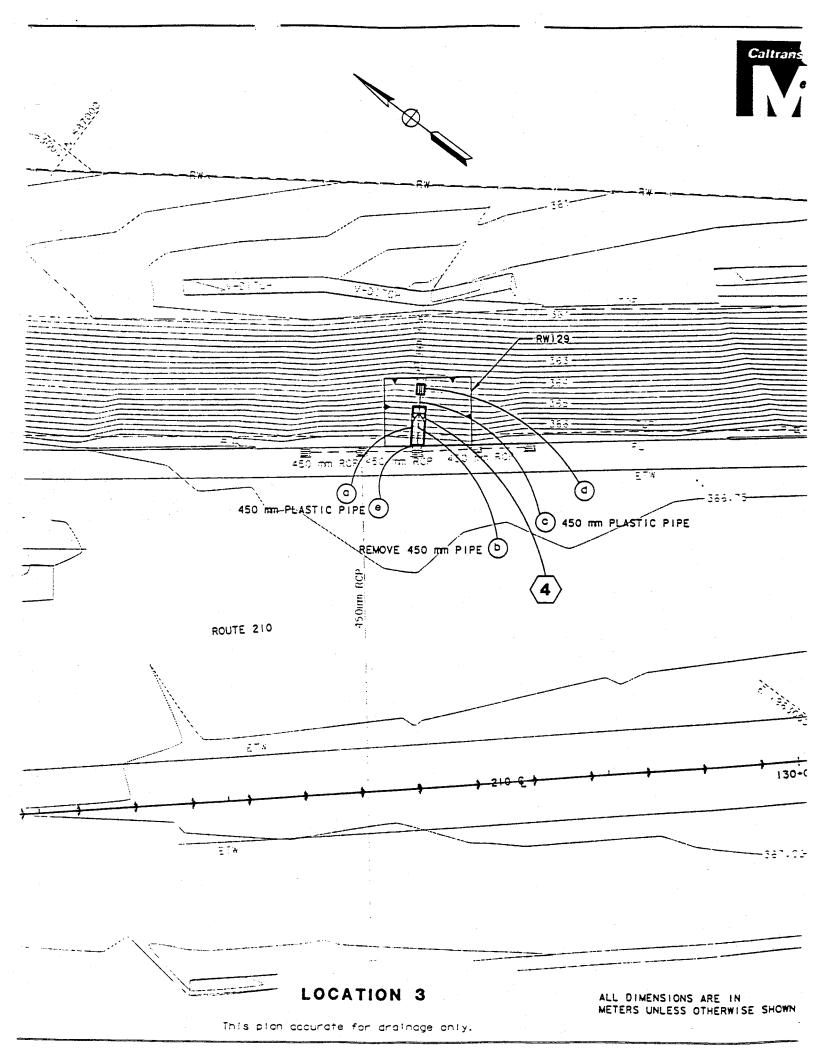


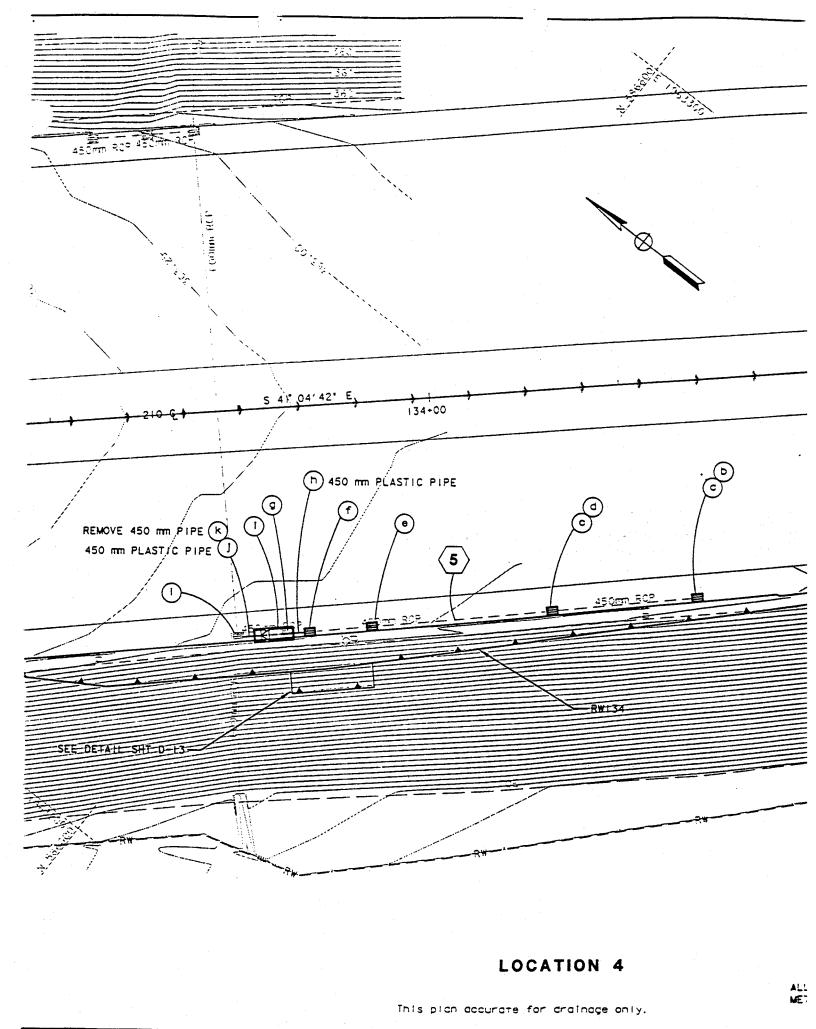




This plan accurate for drainage only.

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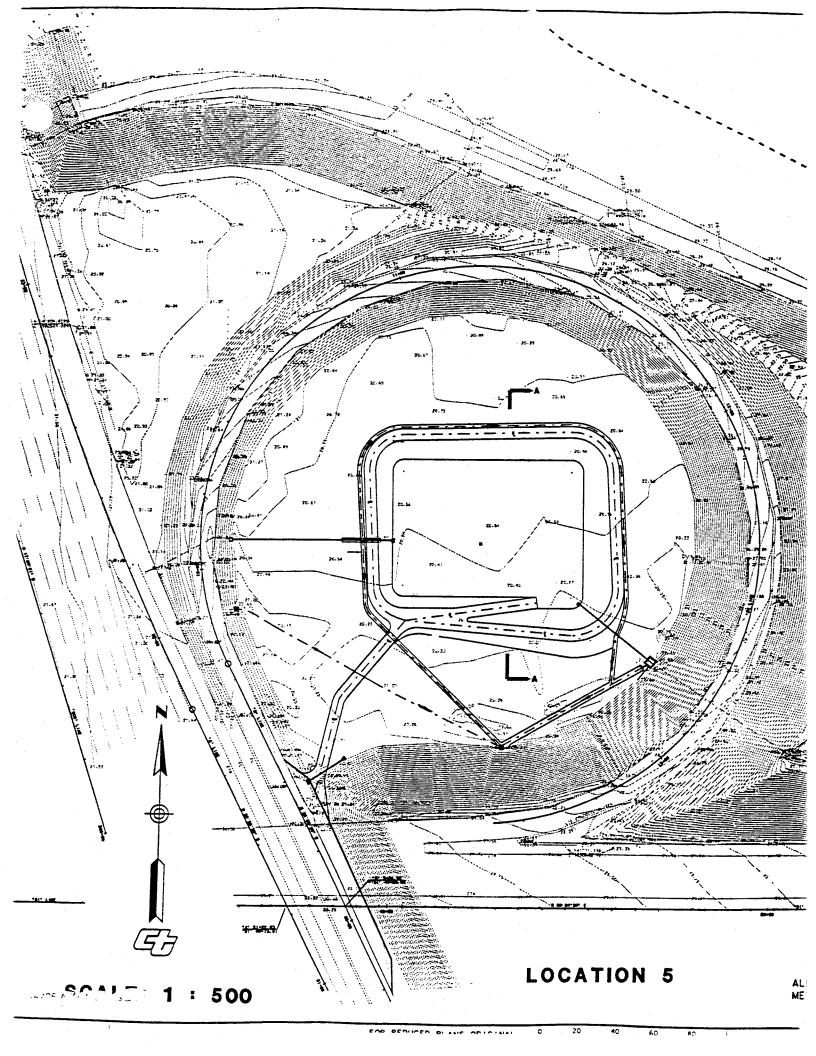
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This plan accurate for drainage only.

LOCATION 4

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ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

May 29, 1998

34123

Dr. Richard Horner 230 N.W. 55th Street Seattle Washington 98107

Subject: Response to Review of District 7 Procurement Design Packages

Dear Rich:

We have received the comments you submitted on behalf of the plaintiffs dated May 22, 1998. Your review covered the BMP procurement Retrofit Pilot Projects for District 7.

For the sake of clarity, your original comment is stated first, including your original headings, followed by our response in italic. Your original comments and our responses are as follows:

SCOPE OF REVIEW

The subject design package covers the following projects, all located in Caltrans District 7 and pertaining to the Stipulation under the Permanent Injunction for that district:

Altadena Maintenance Station biofiltration strip and infiltration trench I-605 N/SR-91 W connector biofiltration strip and swale Cerritos Maintenance Station biofiltration swale I-5 S/I-605 S biofiltration swale I-605 S near Carson biofiltration swale Foothill Maintenance Station catch basin inserts Las Flores Maintenance Station catch basin inserts Rosemead Maintenance Station catch basin inserts Eastern Regional Maintenance Station media filter Foothill Maintenance Station media filter Termination Park and Ride media filter Paxton Park and Ride media filter Alameda Maintenance Station oil/water separator Lakewood Park and Ride Multi-Chamber Treatment Train (MCTT) Metro Maintenance Station MCTT Via Verde Park and Ride MCTT

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CONCLUSION OF REVIEW

We have a continuing concern about the hydrologic analysis underlying all of the retrofit designs, including those in this and preceding packages. We first expressed that concern in our comments on Procurement Design Package No. 1. Your response of May 8, 1998 did not allay those concerns. You stated that the four-fold difference in peak flow rate estimated from two catchments of virtually identical size and impervious cover was due to difference in times of concentration. We will simply have to be shown how that can be true, as we requested in our original comments. The times of concentration in both cases should be of the order of a few minutes, a magnitude at which conventional advice is to discount any estimated variation in time of concentration and to use one value. It seems to us like output of the hydrologic models is being taken uncritically, and we are generally uneasy with it. Until we can be given more confidence, our evaluations and approvals are tentative.

Response: Following the guidelines presented in the Caltrans Highway Design Manual, time of concentrations were estimated for all BMP sites. Given the relatively short travel distances and highly impervious areas, all estimates fell below the minimum time of concentration of 10 minutes (as recommended in section 832.3). Therefore, a value of 10 minutes was used for all sites. With this information, along with the site locations (used to identify the nearest rain gauge), staff at the Los Angeles County of Public Works provided us with rainfall intensities for the 1 year, 24 hour storm for each location. These values were subsequently used to compute the peak flow. A detailed set of hydrologic calculations will be provided for the procurement San Diego sites in question for NRDC review.

Assuming for the moment that the flow estimates are correct, we approve the designs, with comments, for the three catch basin insert locations (Foothill, Las Flores, and Rosemead Maintenance Stations) and the I-605 N/SR-91 W connector biofiltration strip and swale. We tentatively approve the designs for the following projects pending resolution of several issues that we raise in specific comments on those facilities, as well as the hydrologic question:

Cerritos Maintenance Station biofiltration swale
I-5 S/I-605 S biofiltration swale
I-605 S near Carson biofiltration swale
Eastern Regional Maintenance Station media filter
Foothill Maintenance Station media filter
Termination Park and Ride media filter
Paxton Park and Ride media filter
Alameda Maintenance Station oil/water separator
Lakewood Park and Ride Multi-Chamber Treatment Train (MCTT)
Metro Maintenance Station MCTT
Via Verde Park and Ride MCTT

We do not approve Altadena Maintenance Station design for reasons that we state below.

We comment on the approved designs and then elaborate on our objections to both the tentatively approved and unapproved designs in the next series of comments. Where comments are given, satisfactory resolution of our stated concerns is necessary

APPROVED WITH COMMENTS

We approve these designs, pending resolution of hydrologic concerns, but have these comments:

Foothill, Las Flores, and Rosemead Maintenance Stations catch basin inserts

1. We are generally cautious in swapping test and control locations in different years of a study, because of the meteorological variations that often occur. We want to see a listing of the differences that exist between the test and control areas and make some evaluation of whether those differences likely exceed potential hydrologic ones. No decision should be made until the first year's monitoring data are analyzed.

Response: As a clarification, the approach for this BMP is to retrofit two drain inlets at each maintenance station with different types of inserts to compare the relative effectiveness of each type, and not to compare a retrofit site against a control site. Although the ideal situation would be to compare two drain inlets with similar characteristics (water quantity and water quality), the results of the detail survey of the maintenance stations show that this is ideal situation is not obtainable.

The idea of swapping the two types of inserts was mentioned at the March 30th Quarterly Status Meeting to present one approach to resolving the problem of having dissimilar flows at the two inserts. However, it has not been incorporated into the design. The design as shown is based on retrofitting one drain inlet with one type of insert, and the other drain inlet with another type. No decision regarding steps to be taken following the first year of monitoring has been made or is included in the design. As we recall, it was the consensus at the March 30th Status Meeting to maintain the inserts at the same locations throughout the study, and evaluate each on its merits without complicating the analysis with a change in location.

2. We were surprised that the specifications of the previously selected inserts were not presented in the design package. They will have to be given in the bid advertisement. How will these specifications be given?

Response: The specifications of the previously selected inserts (Fossil Filter and Streamguard) will be included in the final version of the specifications.

3. With the Las Flores station under construction, insert installation must wait until all construction areas are completely stabilized.

Response: Construction at the Las Flores Maintenance Station is scheduled to be complete by June of this year. Given that BMP construction is not scheduled to begin until late August, all areas should be completely stabilized by then, but this will be an issue that will be fully documented as a part of the program.

I-605 N/SR-91 W connector biofiltration strip and swale

1. Vegetation must be specified. We presume the recommendations of Martha Blane will be the basis but want to see them reflected in the specifications.

Response: The final version of the specifications will reflect the recommendations of Martha Blane.

2. As part of recording the experience of selecting and designing the site, which is a major point of the Stipulation, it should be discussed that this location is relatively rich in possibilities, some of which are being exploited in this design, but with others (e. g., space for some type of basin) also present.

Response: Comment noted. This will be discussed in the Design Report.

TENTATIVELY APPROVED PENDING RESOLUTION OF ISSUES

These designs are approved pending successful resolution of the following issues, as well as the hydrologic concern:

Cerritos Maintenance Station biofiltration swale

1. There are no details in drawing or verbal form giving dimensions, side slopes, inlet details, etc. We reserve additional comments until we receive those details.

Response: Please refer to Sheets X-1, L-2, D-9, D-12, D-14, and D-15 for details. Sheet D-9 was incomplete at the time of submittal and is enclosed for your review.

2. Vegetation must be specified.

Response: The vegetation mix is given in the specifications, and the final version of the specifications will reflect the recommendations of Martha Blane.

I-5 S/I-605 S biofiltration swale

1. There are no details in drawing or verbal form giving dimensions, side slopes, inlet details, etc. We reserve additional comments until we receive those details.

Response: Please refer to Sheets X-1, L-4, D-11, D-12, D-14, and D-15 for details. Sheet D-11 was incomplete at the time of submittal and is enclosed for your review.

2. Vegetation must be specified.

Response: The vegetation mix is given in the specifications, and the final version of the specifications will reflect the recommendations of Martha Blane.

I-605 S near Carson biofiltration swale

1. It is unclear whether or not the full potential of this site has been utilized. More length is available to treat water drawn from drain inlets upstream of the selected contributing area. We need sufficient detail to make that determination. If more water could be directed into the swale without significant logistical and economic impediments, we want to see more use of the potential. This is an issue like we have discussed before relative to extended-detention and infiltration basins, in which drawing more water was often impeded by constraints but sometimes was not. We want to point out that a swale need not be straight and can be curved around obstructions like trees. Deviating from a linear configuration would allow more space to be utilized here.

Response: The basic difference in techniques used in achieving the objectives of a water quality improvement pilot project versus a water quality improvement program project results in the final design configuration of the BMP. A value was placed on determining the efficacy of the biofiltration swale in terms of water quality improvement in addition to the practical design of the swale. This approach conformed with the monitoring requirements in the Scoping Study and the pilot retrofit BMP was designed accordingly. Caltrans is interested in the performance characteristics of the specific BMPs for future use. While this point may not be as significant to NRDC, it is valuable information for Caltrans. The swale, as designed, meets the criteria in the Scoping Study.

2. There are no details in drawing or verbal form giving dimensions, side slopes, inlet details, etc. We reserve additional comments until we receive those details.

Response: Please refer to Sheets X-1, L-5, D-11, D-12, D-14, and D-15 for details. Sheet D-11 was incomplete at the time of submittal and is enclosed for your review.

3. Vegetation must be specified.

Response: The vegetation mix is given in the specifications, and the final version of the specifications will reflect the recommendations of Martha Blane.

Eastern Regional Maintenance Station media filter

1. It is not certain enough that the anticipated runoff will flow to the treatment unit and that other runoff will not and that the full potential to collect and treat runoff is being used. Please provide a breakdown of the maintenance station into the subcatchment that is expected to flow to the units and the subcatchment(s) expected to be excluded (a simple diagram showing major station facilities and subcatchment boundaries would serve this purpose best). Please indicate if

the existing topography is considered to control flow direction reliably, or if any devices (e. g., low berms) will be used to direct flow toward or away from the filter. We reserve additional comments until we receive the diagram.

Response: The diagram is attached to this letter. We are intercepting the current drainage pattern at the site and diverting to the off-line Austin filter.

2. The type of drainage collection system designed for the Paxton and Alameda locations is generally superior to the system here in terms of ability to collect more site water and should be used to the extent it can be. Please consider and incorporate this design or explain to us why it is not feasible here.

Response: By intercepting the current paved drainage swale we are collecting the drainage runoff in an efficient manner without excessive interruption of the maintenance yard or additional unnecessary costs. A design similar to Paxton or Alameda would require significant regrading and repaving of the site, with associated additional costs

3. Is this an off-line design to the Austin standard, with energy dissipation built in? We believe that it should be, unless there are convincing reasons otherwise.

Response: This is a standard off-line Austin filter and was developed in consultation with Michael Barrett. Energy dissipation is not required since the detention portion of the unit is concrete, and the flow enters the sand filter at very low velocities.

Foothill Maintenance Station media filter

1. Please provide the same kind of catchment diagram as requested for Eastern Regional Maintenance Station. We reserve additional comments until we receive the diagram.

Response: The diagram is attached to this letter. We are intercepting the current flow at the site and diverting to the off-line Austin filter.

2. The type of drainage collection system designed for the Paxton and Alameda locations is generally superior to the system here in terms of ability to collect more site water and should be used to the extent it can be. Please consider and incorporate this design or explain to us why it is not feasible here.

Response: The existing drainage pattern of the site is well established with sump inlets rather than trench grating. The existing inlets and dikes will divert the flow to the treatment system. Again, modification to the site drainage pattern would require significant regrading and repaving, with associated costs.

3. What are the contents of the storage bins shown on drawing D-3? Do they drain into the sand filter? We assume the dashed line on that drawing is an existing drainage pipe. Will it direct runoff to the filter and away from the bins? This line could be replaced with a slot drain to keep

the opposite side and drain to the same inlet. This is one potential additional source of runoff for treatment that we want to explore when we have the diagram.

Response: The bins contain sand and gravel construction materials and are at a slightly higher elevation at the edge of the site. Runoff will not flow to the bins but away from them toward the drain. The inlet is at the low point of the site and will pick up the required flow.

4. Is this an off-line design to the Austin standard, with energy dissipation built in? We believe that it should be, unless there are convincing reasons otherwise.

Response: This is a standard off-line Austin filter and was developed in consultation with Michael Barrett. Energy dissipation is not required since the detention portion of the unit is concrete, and the flow enters the sand filter at very low velocities.

Termination Park and Ride media filter

1. Please provide the same kind of catchment diagram as requested for Eastern Regional Maintenance Station. We reserve additional comments until we receive the diagram.

Response: The diagram is attached to this letter.. We are intercepting the current drainage pattern at the site and diverting to the off-line Austin filter.

2. The type of drainage collection system designed for the Paxton and Alameda locations is generally superior to the system here in terms of ability to collect more site water and should be used to the extent it can be. Please consider and incorporate this design or explain to us why it is not feasible here.

Response: The existing drainage pattern of the site is well established with low point inlets rather than trench grating. The existing inlets and dikes will divert the flow to the treatment system. Again, modification to the site drainage pattern would require significant regrading and repaving, with associated costs.

3. It appears to us that flow could be collected for treatment from the east swale. This is one potential additional source of runoff for treatment that we want to explore when we have the diagram.

Response: This site is very large with a north to south drainage pattern. The plan from the Siting Study was to limit the pilot facilities to the center drainage area. Collection of more drainage area at this site is feasible, but would require a much larger sand filter and changes to the outlet piping. Such modifications would increase construction costs substantially.

4. Will the filter become off-line if all the inlets along the central swale reach capacity?

Response: The filter is off-line after the detention tank fills. The outlet and flow to the filter is limited by the sizes of the orifices in the pipe between the detention and the filter.

5. Is this an off-line design to the Austin standard, with energy dissipation built in? We believe that it should be, unless there are convincing reasons otherwise.

Response: This is a standard off-line Austin filter and was developed in consultation with Michael Barrett. Energy dissipation is not required since the detention portion of the unit is concrete, and the flow enters the sand filter at very low velocities.

Paxton Park and Ride media filter

1. Is this an off-line design to the Austin standard, with energy dissipation built in? We believe that it should be, unless there are convincing reasons otherwise.

Response: This is a standard off-line Austin filter and was developed in consultation with Michael Barrett PhD. Energy dissipation is not required since the detention portion of the unit is concrete, and the flow enters the sand filter at very low velocities.

Alameda Maintenance Station oil/water separator

1. Please provide the same kind of catchment diagram as requested for Eastern Regional Maintenance Station. We reserve additional comments until we receive the diagram.

Response: Diagram is provided with this letter.

2. We assume that the specification will read something to the effect of, "Provide sufficient effective separation area to treat a flow rate up to 500 GPM," and that the manufacturer will be left to size the unit accordingly. Is that the case? We want to understand the process and be sure that a unit of adequate size will be provided.

Response: The oil water separator is described in section 70.1 of the specifications that you received. The specification is basically as you indicated, requiring a flow rate of 1900 liters per minute with a required effluent concentration of less than 10 mg/L free oil and grease with no droplet leaving the unit larger than 20 microns. The manufacturer/distributor is to size the unit, but the minimum size allowed is 1.8 meters in diameter and 7.2 meters long.

Lakewood and Via Verde Park and Ride and Metro Maintenance Station Multi-Chamber Treatment Trains

1. Please provide the same kind of catchment diagram as requested for Eastern Regional Maintenance Station. We reserve additional comments until we receive the diagrams.

Response: Diagrams are provided with this letter.

2. The type of drainage collection system designed for the Paxton and Alameda locations is generally superior to the system here in terms of ability to collect more site water and should be

used to the extent it can be. Please consider and incorporate this design or explain to us why it is not feasible here.

Response: At the Paxton and Alameda sites where sheet flow is prevalent, the trench type drains have been provided. At the other sites where the pavement has been contoured to inlets, we have made use of the existing contours and inlets to collect the storm water. Both drainage systems will work well to develop the off-line treatment systems we are employing at these sites. As indicated above, changes such as you are suggesting to the site drainage patters require significant grading and repaving, with associated additional costs.

NOT APPROVED (ALTADENA MAINTENANCE STATION BIOFILTRATION STRIP AND INFILTRATION TRENCH)

This design is not approved for the following reasons:

1. The design risks performance for the sake of monitoring convenience. We have continually stated that our principal objective is to approach these projects with water quality improvement paramount and other considerations secondary. Ways must be found to avoid sacrificing potential for water quality improvement. In this case a different sampling strategy would avoid the drawbacks noted in the following comments of this design. One such strategy seems to be planned at the I-605 N/SR-91 W location, where a representative sample will be taken from a portion of the contributing area and flow proportioned according to the ratio of the total area to that portion. Grab sampling at a series of points and hand compositing could also be substituted for automatic sampling at a single point in a safe maintenance base location.

Response: We do not see this as a case of monitoring convenience. It is possible to do grab sampling and even composites in this way, however, many storms are at least 24 hours in length, and it is not practical to sample for extended periods and after dark. Given the level of observation and maintenance that will occur, we are comfortable that satisfactory operation can be maintained while also obtaining the testing data required to evaluate BMP's ability to improve water quality. We would welcome specific suggestions to modify the design and still achieve the sampling goals that were previously agreed to by all parties.

2. Flow to a biofiltration strip should be in sheet form. However, sheet flow from the site is first concentrated for measurement and then respread to give sheet flow influent to the biofiltration strip. The concentrated flume outflow may overtop the spreader ditch at times and scour the strip, artificially increasing maintenance requirements and/or reducing effectiveness. It is not impossible that a better design might be concocted, to provide more energy dissipation and guarantee of effective respreading, but we are generally very skeptical of the approach.

Response: The level spreader was used to simulate sheet flow over the biofiltration strip. As a practical matter, sheet flow is very difficult to accomplish without using weirs to control the flow. Commercial tolerances in paving and grading almost always result in channelization of flow providing the potential for scouring and erosion. The design situation is greatly improved from the existing condition. The current condition is characterized by an asphalt concrete swale,

and is not sheet flow. Caltrans monitoring requirements notwithstanding, some type of spreader device, or what would amount to extraordinary regrading of the site, would be required to provide sheet flow to the biofilter at this site. The selected design is seen as the most 'compact' and serviceable. The final design included significant discussion and compromise with the Station staff, it was not simply arrived at by convenience. Operation of the station would be compromised with other designs.

3. Discharge from a biofiltration strip pretreatment to an infiltration trench should be in sheet form. However, outflow from the strip is reconcentrated and introduced to the trench at a single point. This point is adjacent to the trench's overflow, setting up the very real possibility of short circuiting.

Response: The fill material in the infiltration trench has sufficient voids that will allow the inflow to first flow into and fill the trench, much like an underground tank. The flow path to the trench's overflow requires significantly more head than for the water to enter the trench media. Consequently, the trench will fill before any "short circuiting" will occur. Once the trench is full, overflow will occur as planned.

4. The biofiltration strip is too small, both in length and width. Length is restricted by bins or some other facility that should be moved.

Response: The biofiltration strip was sized in accordance with criteria provided in the Scoping Study, while allowing for operation of the maintenance facility. The biofiltration strip width was set at 8 meters which was the minimum width that the Scoping Study recommended. A wider trench is not practical at this site as it would adversely effect maintenance station operations. The length was set at 20 meters, which requires the relocation of three storage bays. Increasing the length further would require relocating the storage bays to a different area within the maintenance station, which is impractical for maintenance station operations. These logistical considerations were discussed at length with maintenance station personnel.

5. Observation wells are a standard feature of infiltration trenches and must be included.

Response: The existing well which was installed during the siting study will be protected-inplace during construction for later use during monitoring. A lysimeter will also be installed (which was not shown on the plans sent to you) as specified in the Scoping Study. An observation well will be added to the design per the Scoping Study requirements.

6. Lining an infiltration trench with geotextile is a standard design feature and must be included.

Response: Lining the trench is included in the design. Please refer to Sheet D-17 for details.

7. Vegetation must be specified.

Response: The vegetation mix is given in the specifications, and the final version of the specifications will reflect the recommendations of Martha Blane.

We hope these responses adequately address your questions. Please feel free to call Yulya Davidova at 619 688 0226, or myself at 714 855 3629 if you have any questions.

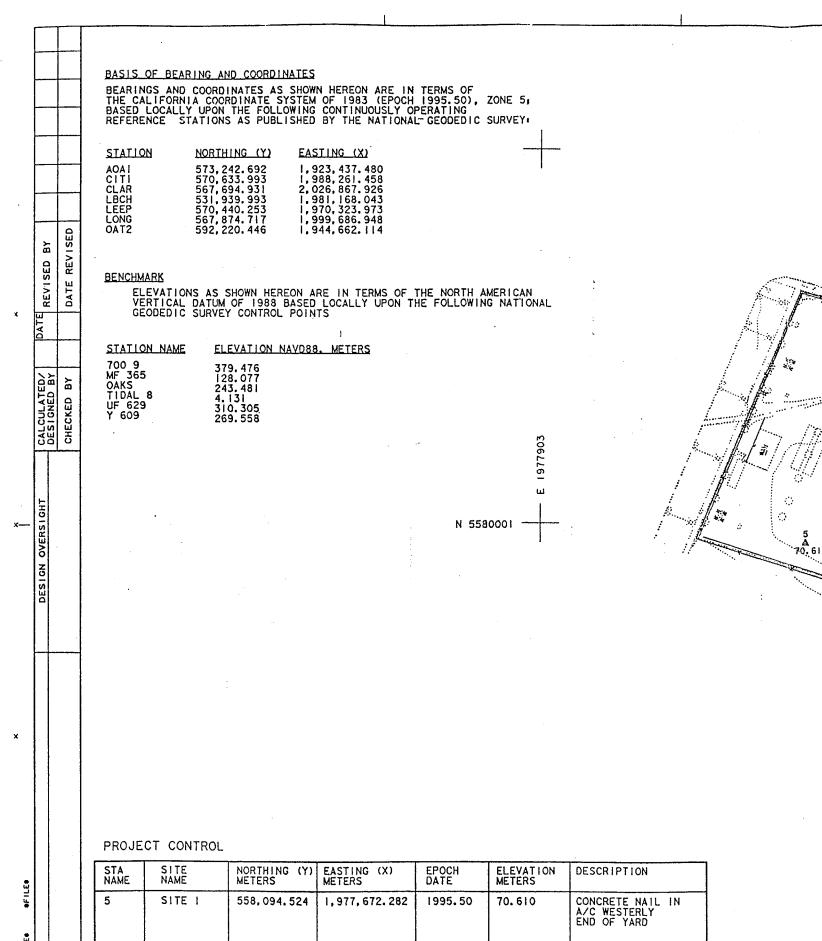
Sincerely,

Scott Taylor, P.E. Project Manager

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Enclosures

Pc Yulya Davidova Steve Borroum M/C
Chris May David Beckman Bob Finn W/O Affill
Gary Friedman W/O



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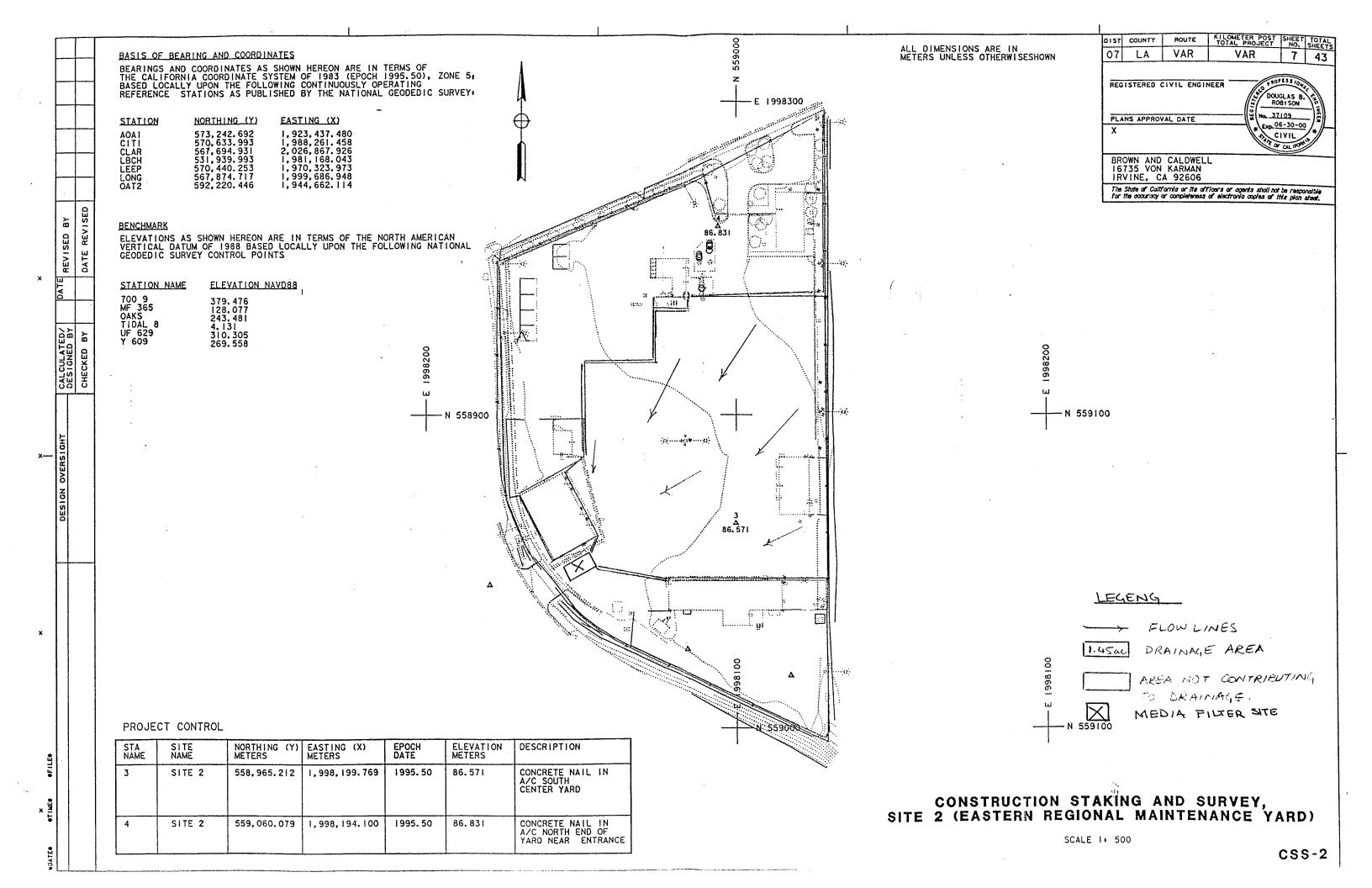
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CONSTRUCTION STAKING AND SURVEY, SITE 1 (ALAMEDA MAINTENANCE STATION)

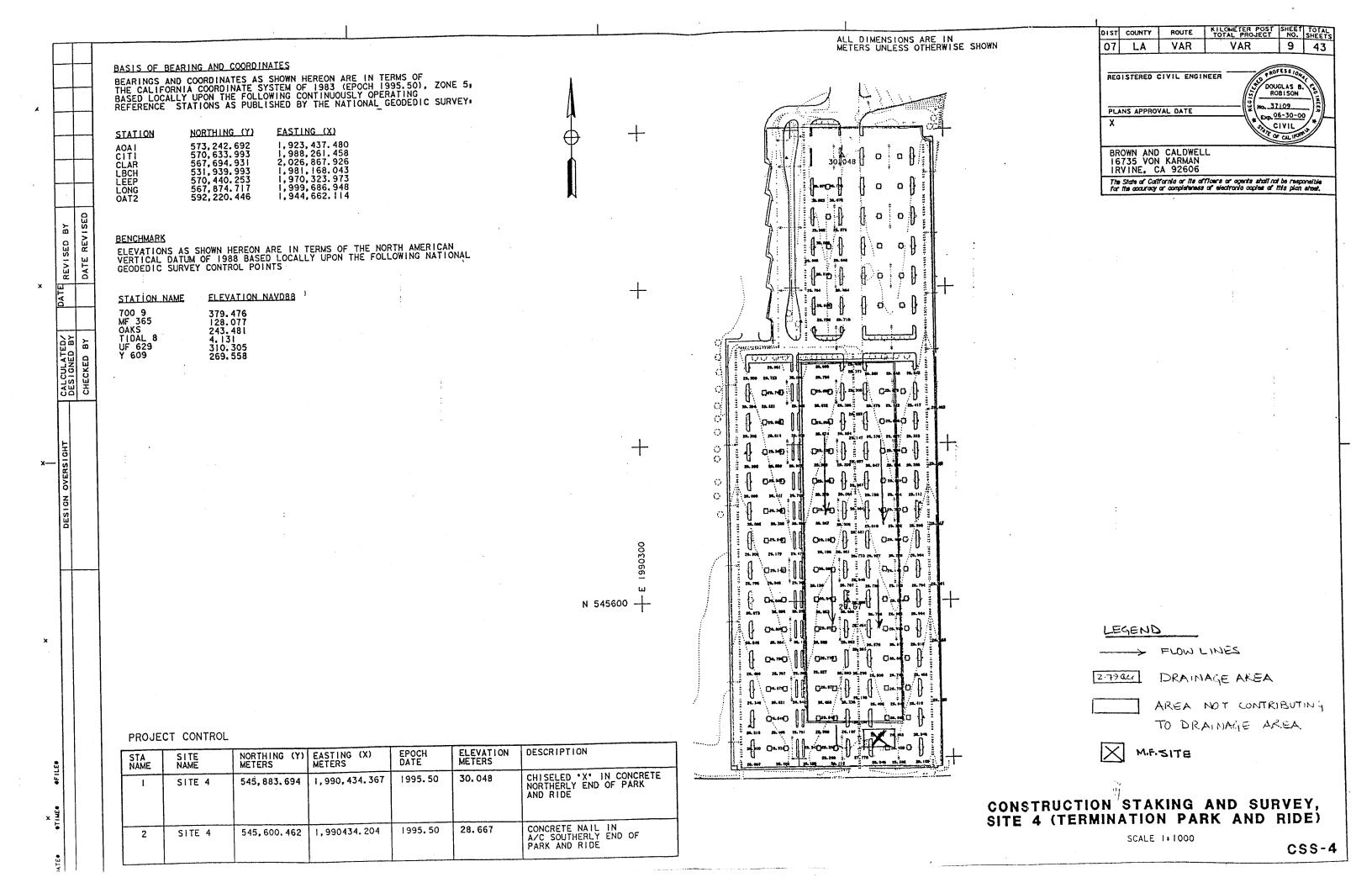
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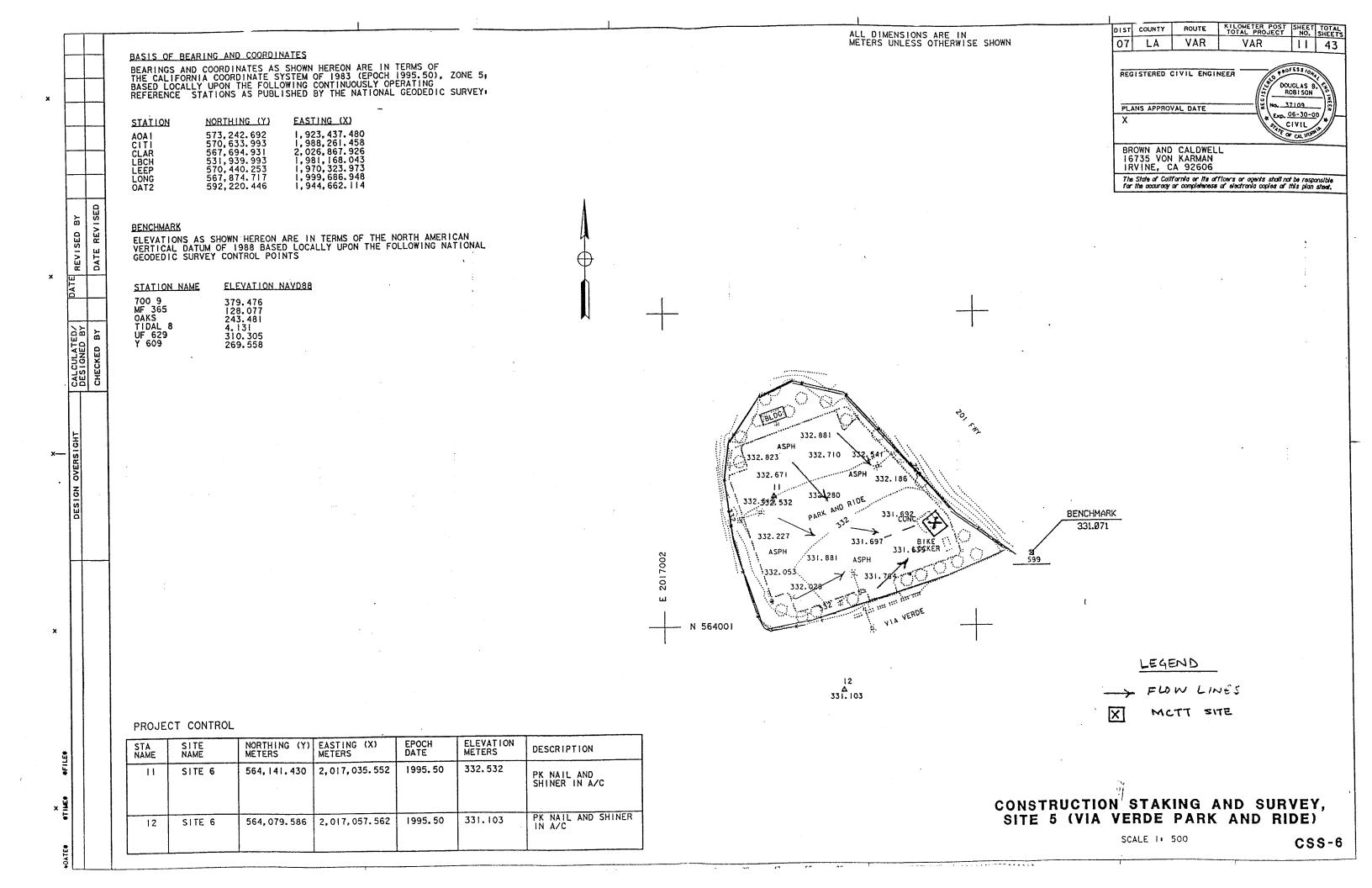
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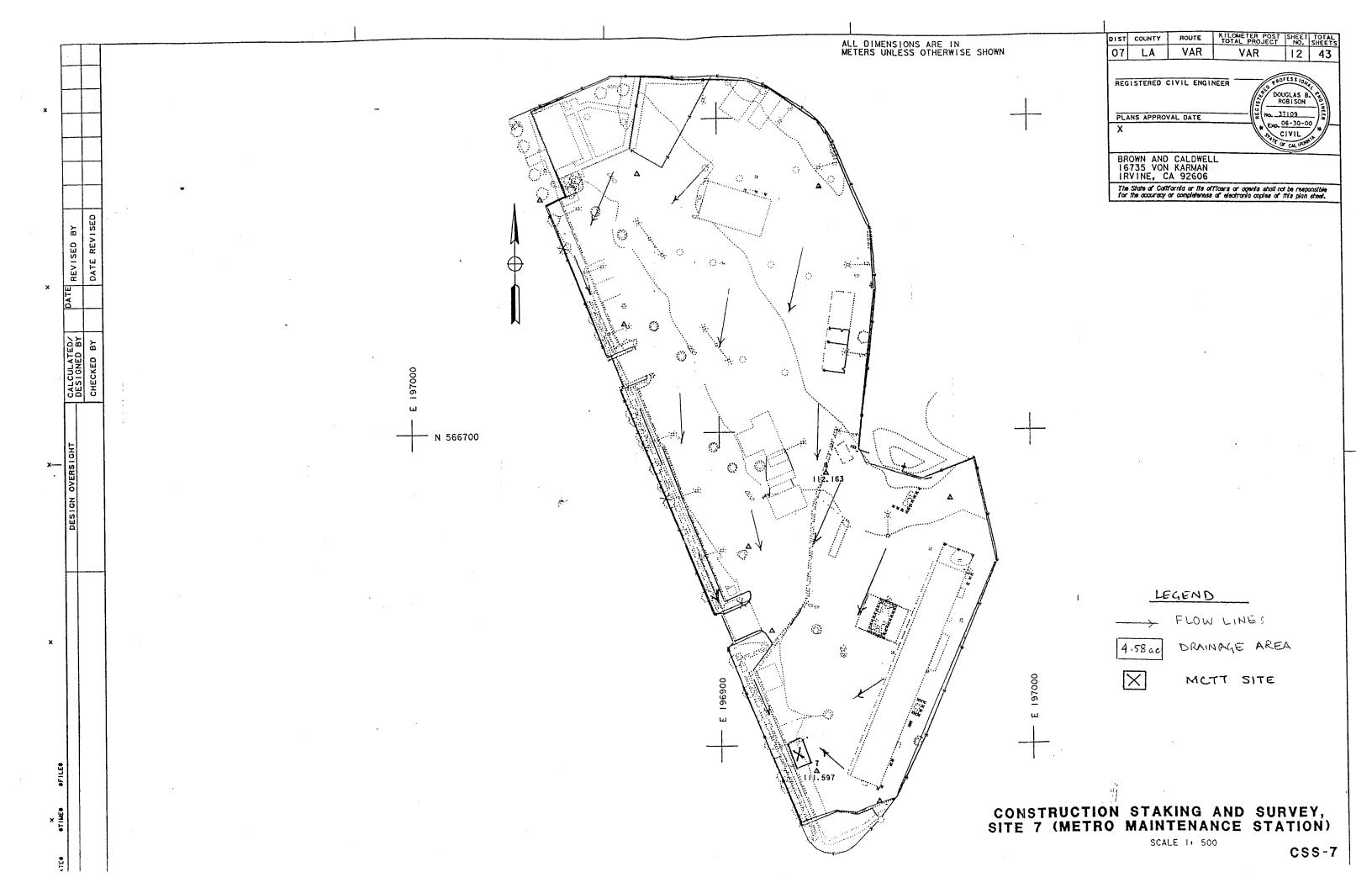
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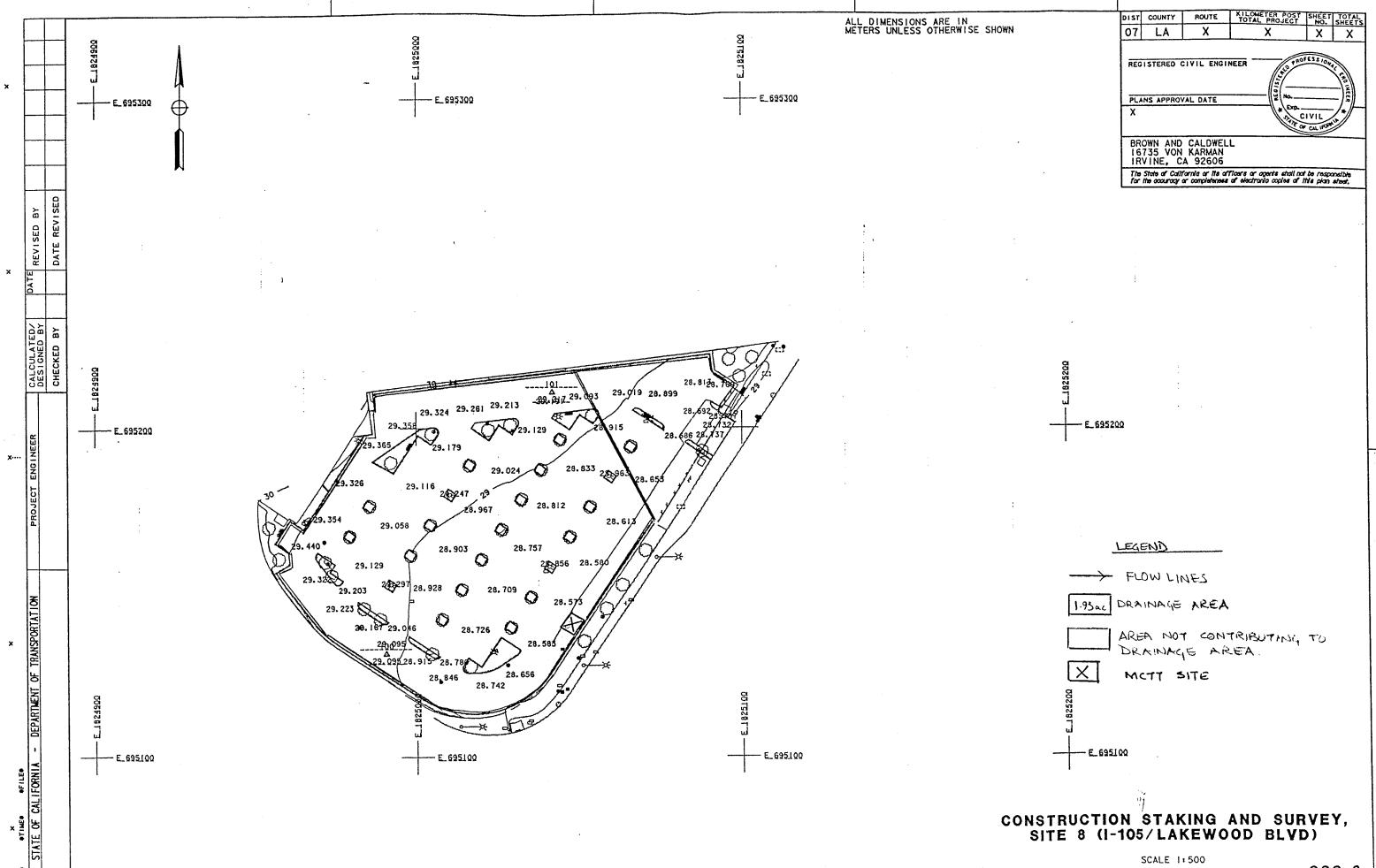
CONSTRUCTION STAKING AND SURVEY, SITE 5 (PAXTON PARK AND RIDE)

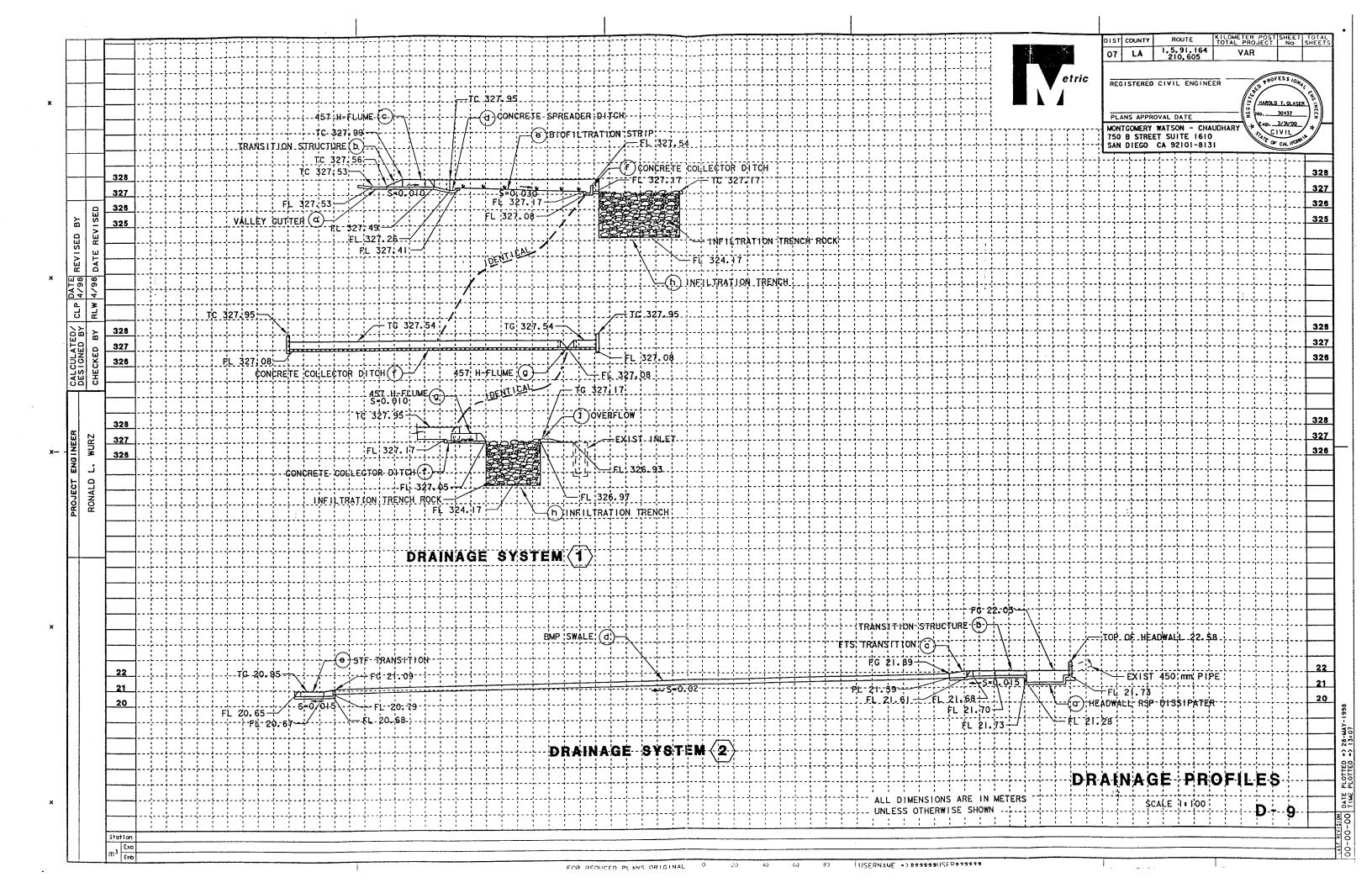
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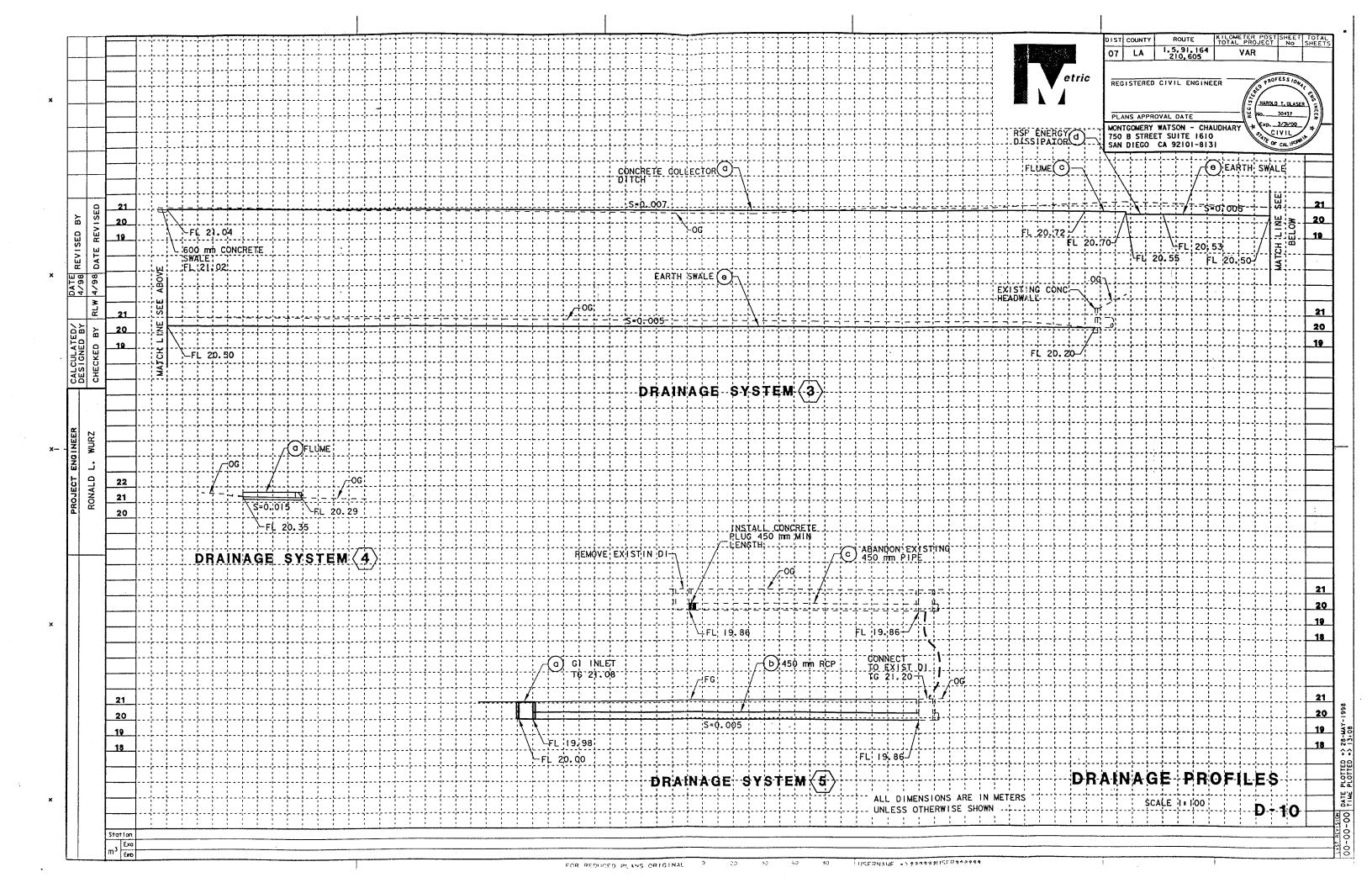
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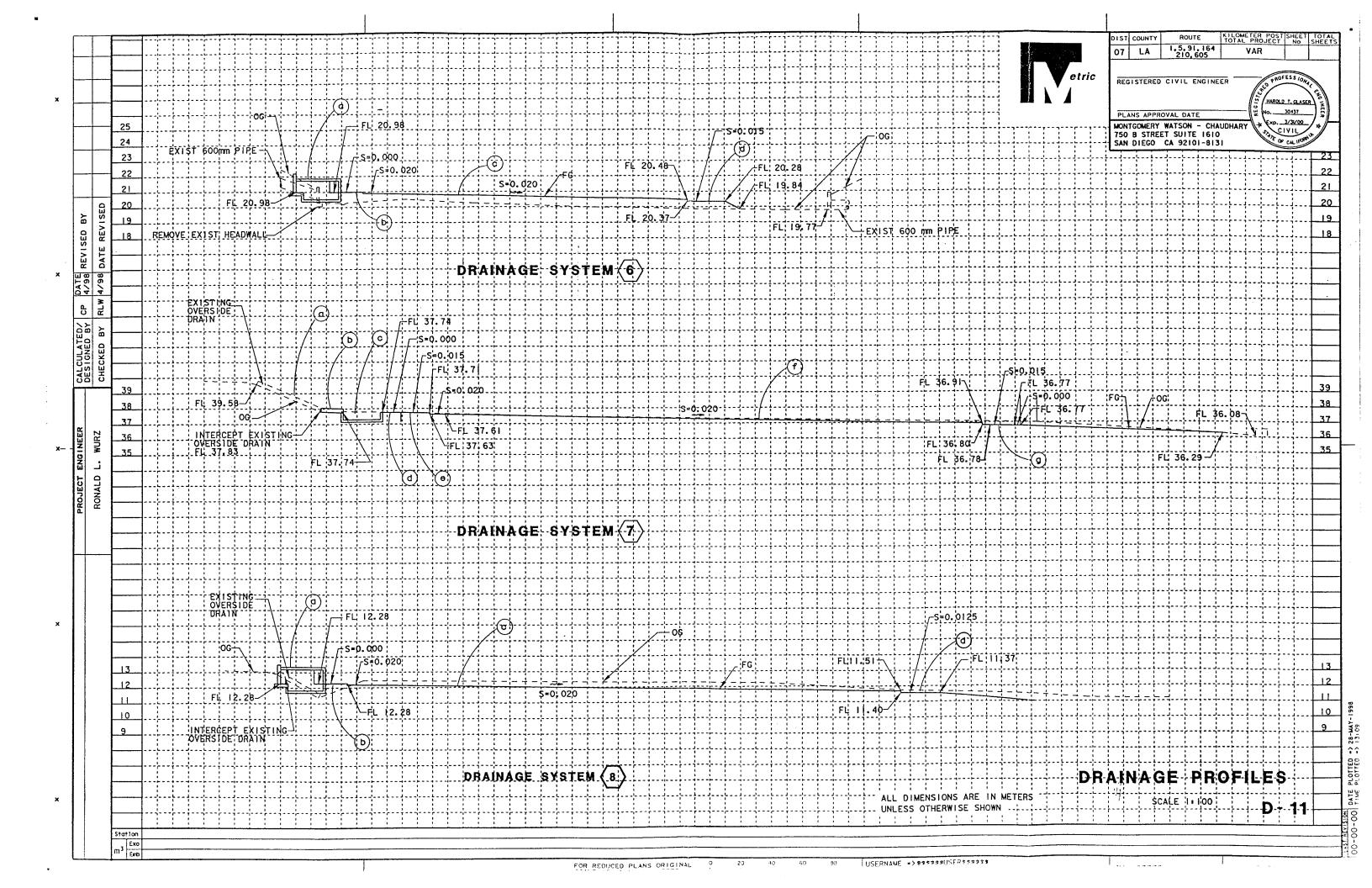


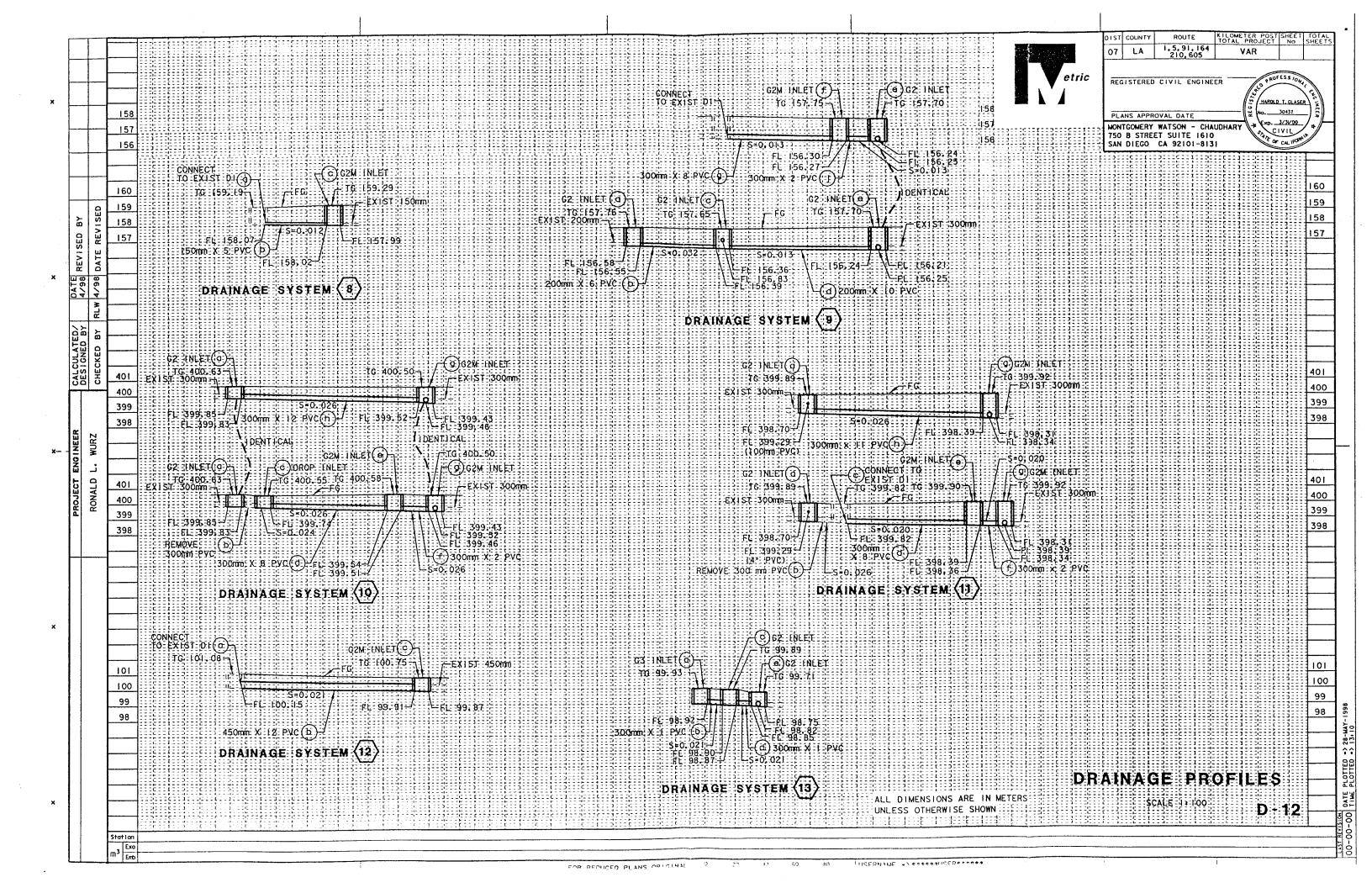












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ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

E-MAILER 5/8

May 8, 1998

R.Himul, Dichool Rev.
FLD EX to Horner 5/18/98

Dr. Richard Horner 230 N.W. 55th Street Seattle Washington 98107

Re: Response to Review of District 11 Procurement Design Package No. 1

Dear Rich:

We have received the comments you submitted on behalf of the plaintiffs dated May 1, 1998. Your review covered District 11 Consent Decree and the Stipulation of the Court overseeing the District 7 Permanent Injunction and two which apply to the District 11 Consent Decree only. The responses were prepared by Robert Bein, William Frost and Associates (RBF) and AEI-CASC, peer reviewed and finalized RBF. Final review and authorization for distribution was performed by Caltrans.

For the sake of clarity, your original comment is stated first, including your original headings, followed by the response in italic. Your original comments and our responses are as follows:

CONCLUSION OF REVIEW

The hydrologic analysis for Location 6, at least, seems to be inaccurate (see comments on that location for details). That observation calls into question all of the hydrologic estimates made for the projects in these and the other design packages. We do not have the necessary information or time to make a determination of the correctness of these analyses, but we can not proceed further with any projects until a qualified person from the design team reexamines the calculations and affirms their accuracy or makes corrections.

Assuming for the moment that the flow estimates are correct, we tentatively approve the designs for Locations 1, 3, and 4 pending resolution of several issues that we raise in specific comments on those facilities, as well as the hydrologic question.

We do not approve the remaining designs in their present form because of various deviations from accepted design practices and consequent reduced potential to make the fullest possible improvement in runoff water quality. The unapproved designs are inconsistent with paragraph 6.60 of the District 11 Consent Decree, which establishes "... potential for improvements in water quality ..." as a criterion. They are also non-compliant with paragraph 1.A of the District 7 Stipulation stating that, "These devices shall be designed, ... at state-of-the-art levels." The problems that we describe, and have also objected to in the first two sets of comments, would have the individual and collective impact of skewing the apparent efficacy of the BMPs, a principal concern of the plaintiffs from the beginning of this process. We elaborate on our objections to both the tentatively approved and unapproved designs in the next series of comments

Professional Service Since 1944

LOCATION 1--KEARNY MESA MAINTENANCE STATION COMPOST FILTER, DISTRICT 11 PROGRAM

The design is approved pending successful resolution of the following issues:

1. It is not certain enough that the anticipated runoff will flow to the compost filter and that other runoff will not. Please provide a breakdown of the maintenance station into the subcatchment that is expected to flow to the filter and the subcatchment(s) expected to be excluded (a simple diagram showing major station facilities and subcatchment boundaries would serve this purpose best). Please indicate if the existing topography is considered to control flow direction reliably, or if any devices (e. g., low berms) will be used to direct flow toward or away from the filter.

Response: The location of the proposed interception drain inlet has been selected from the subcatchments available on the station in an area that has space to construct the filter and access and maintain it. The watershed area consists of an asphalt paved storage area. Flow is being conveyed into the proposed interception drain inlet by way of an existing concrete gutter. A normal depth calculation was performed for the gutter to verify required capacity and flow depth. A hydrology map is included for clarification. It is not practical to regrade the station or divert flow which would otherwise require modification to the existing drainage systems. Consequently, no berms or other devices are used to change the existing drainage flow patterns at the station.

2. We corresponded with Stormwater Management, the manufacturer of the unit that will be used, and received the strong recommendation that pretreatment and a high-flow bypass be provided. We understand that you got the same recommendation. We believe this recommendation is sound, and it must be followed for our approval. According to the manufacturer, pretreatment significantly reduces maintenance, even in a situation where sediment loading should be relatively low. The StormGate system offered by Stormwater Management provides both high flow bypass and sufficient pretreatment capability for the needs of this application. Selecting it would meet with our approval.

Response: In regard to the first point concerning the pre-treatment, we also spoke with Felon Wilson of Stormwater Management and we agreed with him that because the tributary area is fully paved pre-treatment is not warranted. In regard to the second point concerning the high flow bypass, the proposed drain inlet has been sized to intercept 2.5 c.f.s. of the tributary 1-year storm total 2.7 c.f.s. Runoff resulting from significantly more intense storms will exceed the hydraulic capacity of the BMP inlet works. This will force a flow-by condition at the proposed interception drain inlet and thusly serve as a high flow bypass. The compost filter has been sized to accommodate 2.7 c.f.s. The maximum inflow into the filter is 2.5 c.f.s.

LOCATION 2--ESCONDIDO MAINTENANCE STATION SAND FILTER, DISTRICTS 7 AND 11 PROGRAMS

This design is not approved in its present configuration, because it does not properly use the "Delaware design" and is thus not an appropriate pilot test of it. The Delaware design intends for sheet flow to enter over the full length of the sediment chamber through slots in its lid, and not as a series of concentrated flows through a distribution pipe as in this design. In our experience the intended design leads to reliable and trouble-free operation, and we object to deviating to a system that may not distribute flow as uniformly nor be as problem-free. To obtain sheet flow introduction the filter could be moved to the location where the grated inlet is in the current design and low berms provided to direct flow.

We surmise that the distribution system was designed to provide for inflow monitoring at a single point. However, we have not demanded that all inflows and outflows be monitored; in fact, we have emphasized other means of judging performance. While monitoring would increase information, it does not yield a full picture of performance because of the inability to monitor all flow. We therefore do not favor sacrificing realistic pilot testing to monitoring exigencies.

Nevertheless, adequate monitoring can still be performed with sheet flow introduction. The inflow sampler can draw from a well mixed point in the sediment chamber and be triggered by a flow meter at the outlet point. This scheme implicitly assumes equality in the influent and effluent flows, a good assumption with a tightly built filter. There is a short lag between runoff beginning to enter and triggering, but the error introduced is much smaller than any error from sampling only a few storms a year.

We are willing to discuss options that may be mutually agreeable on certain conditions. First, the extra expense of a distribution system must not be counted as part of the capital cost. Second, considerable care must be taken to get uniform flow distribution simulating the intended Delaware design. Third, any extra maintenance burden and expense needed to keep the distribution system functioning to provide uniform flow distribution must not be counted in accounting for maintenance problems and costs.

Response: Please note that the series of distribution pipes are for the outlet side of the filter and that the single 250mm pipe is the inflow pipe. Additionally, we spoke with Randy Grier at the State of Delaware Water Resource concerning using a piped inflow versus allowing the flow to enter the sediment chamber via grates. He stated that while the grate inflow is the standard approach the filtering ability of the system will not be appreciably altered using the pipe inflow. Attached is the standard drawing of the sand filter that we obtained from Mr. Grier. Please note that the design shown on the plan matches the standard drawing except for the mentioned grates. The discharge velocity in the inlet pipe is low, and given that the sedimentation chamber works on an overflow principle, even distribution of flow to the sand filter will occur.

In addition to reaching agreement on this point, our approval will depend on successful resolution of the following issues:

1. It is not certain enough that the anticipated runoff will flow to the sand filter and that other runoff will not. Please provide a breakdown of the maintenance station into the subcatchment that is expected to flow to the filter and the subcatchment(s) expected to be excluded (a simple diagram showing major station facilities and subcatchment boundaries would serve this purpose best). Please indicate if the existing topography is considered to control flow direction reliably, or if any devices (e. g., low berms) will be used to direct flow toward or away from the filter.

Response: The location of the proposed interception drain inlet has been placed to capture the maximum amount of available watershed area. The watershed area consists of asphalt paved storage and parking area. Flow is being conveyed into the proposed filter by way of an existing AC dike. The proposed interception drain inlet has been sized to intercept the entire 1-year storm runoff. A hydrology map is included for clarification.

2. Two alternative designs are proposed for this project, but the differences in their purposes and which is preferred are not clear. These points must be clarified.

Response: An alternative design was developed to provide flow attenuation for the site also, this approach has since been abandoned by way of the analysis prepared by RBF.

LOCATION 3--LA COSTA PARK AND RIDE SAND FILTER, DISTRICT 11 PROGRAM; LOCATION 4--SR 78/I-5 PARK AND RIDE SAND FILTER, DISTRICT 7 PROGRAM

These designs are approved pending successful resolution of the following issues:

1. Are these sand filters fully according to the standard "Austin design?" Figure 1-60 in the City of Austin Guidelines has more detail on entrance energy dissipation features (before the sedimentation chamber) than is present on the design plan. We want those features to be included.

Response: The "Austin Design" standard does include an energy dissipation feature but also specifies a clay lining for the sedimentation chamber. The design proposed incorporates a concrete lining due to site constraints. Therefore, the energy dissipation element is not needed. This point was clarified with Dr. Barrett.

2. At Location 3, will some runoff bypass to the lagoon that could be channeled into the filter with minor work such as low berms? We wish to include all runoff for which treatment is feasible.

Response: The sand filter inflow system is designed to capture all runoff originating from the paved area as well as some landscape areas for the design storm. The remaining landscape/natural area directly tributary to the lagoon is minimal. Capture of this area is not practical from a drainage diversion standpoint, nor would it be desirable to direct additional pervious area to the filter.

3. Outlet energy dissipation must be specified.

Response: The filter outflow and high flow bypass are routed to the existing culvert system. Overall head on the system is reduced with the installation of the filter, therefore, the existing condition will be improved. Currently, there does not appear to be a significant scour problem around the existing outfall pipe. Finally, the existing culvert outfall is located outside of Caltrans right of way in an ecological preserve. Permitting for such an effort would not be forthcoming in the timeframe of this project.

LOCATION 5--MELROSE/SR 78 BIOFILTRATION SWALE, DISTRICTS 7 AND 11 PROGRAMS

The design is not approved because it deviates from state-of-the-art design criteria (e. g., Federal Highway Administration's Evaluation and Management of Highway Runoff Water Quality) in the following ways:

1. The design storm flow velocity (1.2 ft./sec.) is too high. The velocity must be kept under 1 ft./sec. to maintain grass in an upright position for filtering.

Response: The Scoping Study does not specify a maximum velocity of 1 foot per second. It specifies a maximum of 4 feet per second with a preferred velocity of less than 0.9 feet per second. The same document also specifies a minimum swale slope of 1%. The current proposed design utilizes a slope of 0.80% and varying bottom width resulting in a calculated velocity of 1.1 to 1.5 feet per second. The values are in line with the Scoping Study.

2. The design storm residence time is too short. We calculated less than the 5 minutes claimed with a 1.2 ft./sec. velocity and a length measured from the design plan (~ 190 ft). Excessive velocity and insufficient residence time can be remedied by allowing increased flow depth (up to 4 inches, if vegetation is left higher than that), greater swale width, or both. It has been found that width should be limited to 10 ft., because of the difficulty of constructing a level bottom in a very wide swale. However, a wide swale can be separated into two parallel ones separated by a berm (see King County Surface Water Design Manual, 1996 draft). Flow must be well distributed at the inlet to ensure uniformity across the full width. Of course, insufficient residence time can also be corrected by more length if it is available. These options must be explored to bring the swale into compliance with all state-of-the-art design criteria.

Response: Please note that the plans submitted to you are half-sized plots (see bar scale). The proposed biofilter swale is 114 meters (374feet) in length and varies from 3 to 6 meters (10 to 20 feet) in width. Using the velocities stated above and this correct length produces a residence time of 5.2 minutes. Agreed that a residence time beyond the minimum is desirable. The current design already uses all of the available area and therefore the length cannot be extended.

3. The inlet design creates a great risk of erosion and tendency toward flow short circuiting. It is proposed to discharge the influent water on a 16 percent slope at 4.4 ft./sec. velocity into a concrete entrance section with no roughness elements to dissipate energy. The design must ensure that entering flow will not erode, nor at any point within the vegetated swale flow at more than 1 ft./sec.

Response: The mentioned 16% occurs upstream of the proposed trapezoidal flume. The proposed slope downstream of the flume is only 0.8%. Hydraulics were computed to determine the water surface profile and associated velocities through the entire inflow and BMP system. We will modify the BMP inlet such that the velocity entering the grass win not exceed 2.5 ft/s (HDMI, 873.3I).

In addition to correction of these deficiencies, our approval will depend on resolution of these additional points:

1. We need reassurance on the vegetation specification from authorities with relevant experience in the San Diego area. We are pleased to learn that you have retained Martha Blane to evaluate vegetation specifications and provide recommendations.

Response: We will incorporate recommendations per her report into the plans and specifications.

2. Two alternative designs are proposed for this project, but the differences in their purposes and which is preferred are not clear. These points must be clarified.

Response: An alternative design was developed to provide flow attenuation for the site also, this approach has since been abandoned by way of the analysis prepared by RBF.

3. It is unclear from the plans what kind of flume will be used as a control device for flow measurement at the inlet. Normally, an off-the-shelf device appropriate for the service would be purchased from a supplier. We request information because of the relationship of this question and the inlet section design covered above. A way must be found to perform monitoring without having a design that will create erosion. Also, very high entrance velocity is inimical to accurate flow measurement.

Response: The plans indicate a trapezoidal flume. Flume details have been added to the plan set.

LOCATION 6--PALOMAR AIRPORT ROAD BIOFILTRATION SWALE, DISTRICTS 7 AND 11 PROGRAMS

The design is not approved for the following reasons:

1. The design storm flow rate estimate (1.0 cfs) is very questionable. The contributing catchment sizes here and at Melrose/SR 78 are almost identical, and both are virtually all paved. However, the flow rate estimate here is only one-fourth the estimate at Melrose/SR 78. We have not been given the details, nor do we have the time now, to check the estimate; but see no way that it can be as low as 1.0 cfs. This disparity must be investigated and calls into question all of the hydrologic estimates.

Response: The difference in peak discharge for the two sites can be attributed to the difference in the length of the two flow paths. This produces different time of concentration values and subsequent runoff totals. The shape of an area can greatly influence the peak discharge value but all other things being equal, has no influence on the runoff volume.

2. A great deal of the space available for biofiltration is devoted instead to a concrete entrance channel. The space must be used to maximum water quality advantage, allowing flow to pass over the shoulder along the full available length, onto vegetation, and then along a vegetated channel. Poor use of space makes the hydraulic residence time insufficient. We calculated less than the 5 minutes claimed with a 1.0 ft./sec. velocity (with the unlikely assumption that this velocity is correct, given the suspect flow rate) and a length measured from the design plan (~ 160 ft). We surmise that the project was designed in this way to allow influent monitoring at a single point. However, we have not demanded that all inflows and outflows be monitored; in fact, we have emphasized other means of judging performance. While monitoring would increase information, it does not yield a full picture of performance because of the inability to monitor all flow. Therefore, it is better to monitor some facilities of a given type more intensively than to monitor all with less coverage. In these circumstances we can not see sacrificing the main goal (learning how best to gain the most water quality benefit) to an imperfect means to that end and a secondary consideration.

Response: Please note that the plans submitted to you are half-sized plots (see bar scale). The proposed biofilter swale is 92.5 meters (304 feet) in length. The concrete swale has been designed to convey the complete 1-year storm runoff into the biofilter swale while allowing for the required 5 minutes of residence time. The concrete swale is inexpensive and requires minimal maintenance.

In addition to correction of these deficiencies, our approval will depend on resolution of these additional points:

1. As with the Melrose/SR 78 swale, we need reassurance on the vegetation specification from Martha Blane.

Response: Will incorporate recommendations

2. The swale side slopes are inconsistent between the design plans and written information and must be reconciled.

Response: The plans are correct. The written information will be updated.

LOCATIONS 7A AND B--CARLSBAD MAINTENANCE STATION INFILTRATION TRENCH AND BIOFILTRATION STRIP, DISTRICTS 7 AND 11 PROGRAMS

This design is not approved at this time, because the intended operation is obscure and seems to be ill conceived. The plan shows the biofiltration strip paralleling the entire infiltration trench. Section B-B suggests that the portion of the strip nearest the inlet of the trench drains onto the trench, with the balance discharging into a biofiltration swale that bypasses the infiltration trench. However, the printed information about this project does not seem to be consistent with that interpretation. It implies that the two treatment devices are entirely separate and that the trench receives all inflow at one point from the concrete swale. We thought that the strip was to be a pre-treatment device prior to the trench. Feeding all flow to the trench at a single point, if that is the design, will overload the media near there. What is the point of having a trench open to receive flow all along its length?

We are left to speculate about what is being attempted here. Is the idea to use monitoring of the trench influent to characterized the water quality of the inflow to both it and the strip? Monitoring will then occur at the end of the grass swale, which will represent treatment in both the strip and the swale, instead of in just the primary device being studied at this site, the strip. Before we can consider approval, we need an explanation and justification of this design and how the monitoring scheme will yield reliable performance information. As we have stated before, we object to compromising the performance of the treatment units in favor of monitoring requirements, when we have emphasized techniques of judging performance other than conventional stormwater monitoring practices.

Response: The trench inflow has been redesigned to sheet flow across the biofilter strip by way of a channel side weir. The redesign also incorporates additional features to separate the strip into two parts to facilitate monitoring monitoring. The trench inflow sample is used for compiling data for the effectiveness of the biofilter strip. The second portion of the strip enters the outlet monitoring device. There was insufficient room at this location to monitor inflow and outflow from the strip while maintaining all flow to the trench. Consequently, about one-third of the site flow (strip outflow monitoring) bypasses the trench and discharges to an existing curb and gutter. We have included a revised layout sheet showing the new configuration for your information/use.

In addition to these points, our approval will depend on resolution of these additional items:

1. It is not certain enough that the anticipated runoff will flow to the treatment units and that other runoff will not. Please provide a breakdown of the maintenance station into the subcatchment that is expected to flow to the units and the subcatchment(s) expected to be excluded (a simple diagram showing major station facilities and subcatchment boundaries would serve this purpose best). Please indicate if the existing topography is considered to control flow direction reliably, or if any devices (e. g., low berms) will be used to direct flow toward or away from the filter.

Response: A hydrology map has been attached for clarification. No berms or other devices are used to redirect flow.

2. We want to see dissipation of energy in concentrated flow such as would enter the trench from a concrete swale at the head end.

Response: The revised inflow system results in adequately low velocities unto the biofilter strip.

3. As with the swales at other locations, we need reassurance on the vegetation specification from Martha Blane

Response: Will incorporate recommendations.

4. We understand that maintenance base employees are unhappy with parking spaces near the work areas being taken for the treatment system. In this situation we want explanatory signage and education ("tailgate training") to be included as part of the project.

Response: The project plans include work to restore their parking in the immediate area. Caltrans employees will be properly notified and alerted to required sensitivity to the BMP installation at all sites. Signage is not necessary.

Please feel free to contact us with any questions or if we can provide any additional information. We would be happy to meet with you to discuss these comments in person.

Sincerely,

ROBERT BEIN, WILLIAM FROST & ASSOCIATES

William R. Whittenberg, P.E., DEE

Task Order Manager

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Enclosures

Cc: Chris May, NRDC

David Beckman, NRDC

Terry Tamminen, Santa Monica Bay Keeper

Jeremy Johnstone, EPA

Ken Moser, San Diego Bay Keeper

Steve Borroum, Caltrans

Yulya Davidova, Caltrans

Scott Taylor, RBF

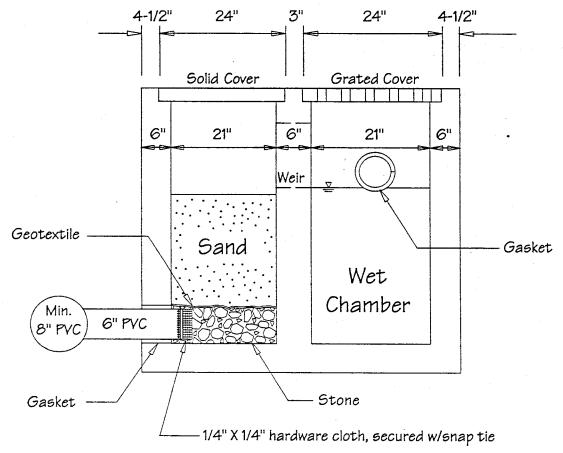
Erwin Fogerson, AEI-CASC

DRAFT

Standard Detail & Specifications

Delaware Modular Sand Filter





Section View

Materials

- 1. Sand Concrete sand (AASHTO M6 or equiv.)
- 2. Stone 34" washed (DE No. 57 or equiv.)
- 3. Geotextile Woven drainage fabric (Amoco 1198, Mirafi-700XG or equiv.)
- 4. Piping PVC (Min. SDR 35)
- 5. Gaskets Compatible w/ PVC schedule (A-LOK, Star Seal or equiv.)
- 6. Grates Cast iron storm drain (East Jordan 6957 Type "M-2" or equiv.)
- 7. Solid covers Cast iron storm drain (East Jordan 6957 Type "A" or equiv.)
- 8. Frames ¼" steel angle
- 9. Concrete 4500 psi at 28 days
- 10. Min. Reinforcing 2 mats of 6" X 6" W4/W4 wire mesh

Source:

Design: Shaver/Baldwin Modifications: Carey/Greer Drawing: Modified from Vandemark & Lynch Symbol:

Sand Filter

Detail No.

DE-SWM-1.0

Sheet 2 of 2

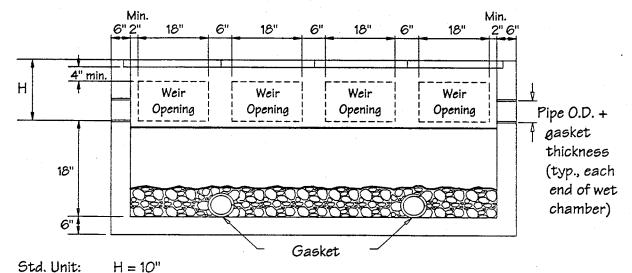
Date: 3/98

DRAFT

Standard Detail & Specifications

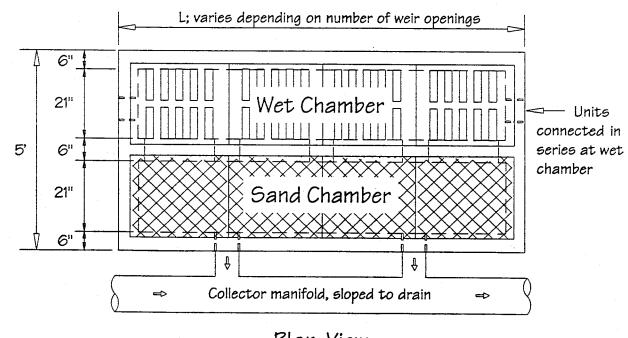
Delaware Modular Sand Filter





Hi-Head Unit : H = 30"

Elevation View



<u>Plan View</u>

Source:

Design: Shaver/Baldwin Modifications: Carey/Greer Drawing: Modified from

Vandemark & Lynch

Symbol:

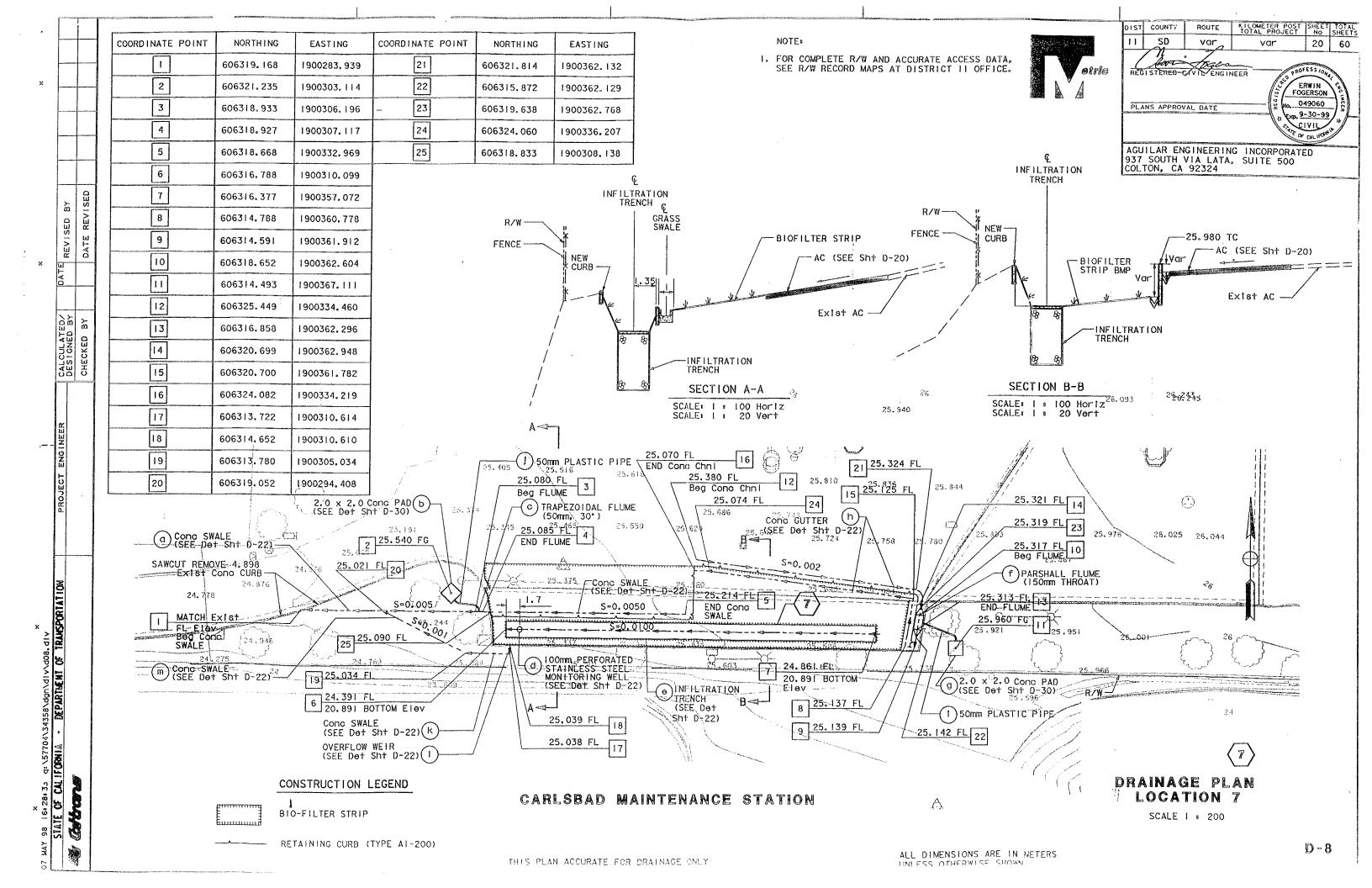
Sand Filter

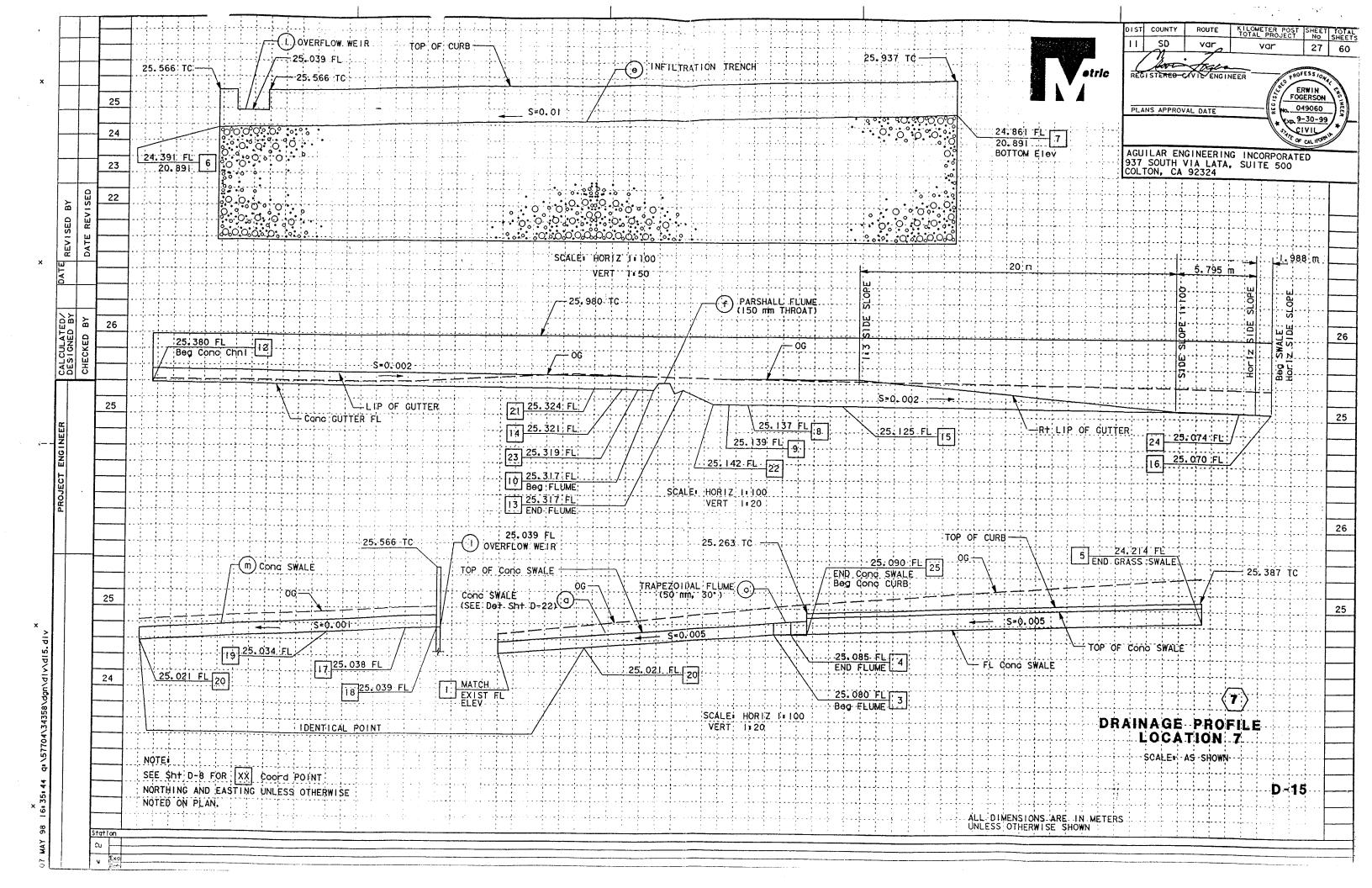
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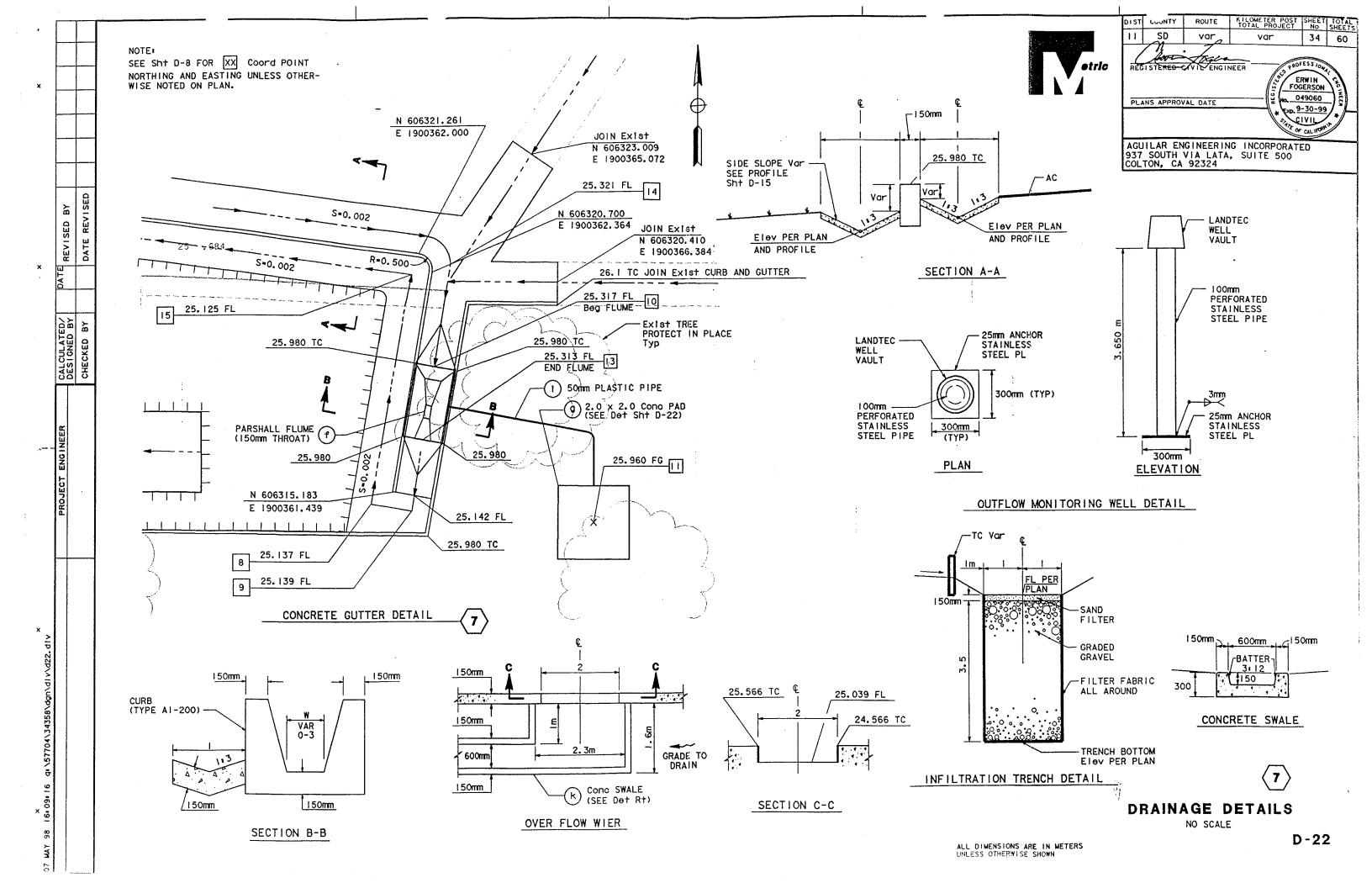
DE-SWM-1.0

Sheet 1 of 2

Date: 3/98







ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

Herles Doc. #- Sent w/o #ON to Nimi for # for her files only.

JN 34358

April 20, 1998

Dr. Richard Horner 230 N.W. 55th Street Seattle Washington 98107

Dear Rich:

We are in receipt of the comments you submitted on behalf of the plaintiffs on April 15, 1998 relative to the BMP Retrofit Pilot Programs in District 7 and District 11. Your review covered only the PS and E package for projects within District 11 as they pertain to both the District 7 Stipulation and the District 11 Consent Decree.

We have reviewed your comments and offer the following responses. For the sake of clarity. your original comment is stated first, including your original headings, followed by our response in italics. We feel that a face-to-face meeting with you to discuss these comments is important. Accordingly, we would like to schedule the meeting during the week of April 27 in San Diego, Irvine or Sacramento, at your convenience.

Your original comments and our responses are as follows:

CONCLUSION OF REVIEW

We tentatively approve the design of the I-5/SR 56 extended-detention basin pending resolution of several issues that we raise in specific comments on that facility.

We do not approve the remaining designs in their present form on the following grounds:

1. They exploit only a fraction of the full potential for improvements in water quality by not utilizing much of the area available.

The basins use the amount of area required per design guidelines specified in the Response: Scoping Study and the flow tributary to each location. The basin volumes and drain times have been conservatively designed. For example, where the FHWA publication indicates a 24-hour to 48-hour drain (emptying) time, the basins have been designed with a 72-hour drain time to ensure achieving a 24-hour average detention time.

The opportunity to direct more discharge to the sites is not viable since this would entail flow diversions with implications to down stream storm drain system capacity, and exceptional added

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complexity and expense associated with the jacking of storm drains under mainline freeway and ramps. The jacking of new storm drain systems under existing Caltrans facilities is beyond the scope of this project, which is an incorporation of BMPs into existing facilities using an in-line arrangement.

2. They reduce potential water quality improvement by not being designed at state-of-the-art levels.

Response: The basins have been designed to state-of-the-art levels. The criteria in the Scoping Study were used for each site, and conservative design assumptions were made for each site. Design of the facilities was done in consultation with Dr. Michael Barrett, who has extensive experience in the design, construction and operation of structural BMPs.

Relative to detention times, Young et al indicate that a 24 hour emptying time for the full water quality volume is sufficient. Dorman (1996) indicate that a 12-hour average detention time is sufficient. Other authors disagree on what constitutes an adequate aspect ratio (4:1,3:1, etc.). However, increasing the drainage time to 72 hours for full basin conditions, prevents water from flowing in one end and out the other, and reduces the need for extremely long narrow basins. An extended detention basin was recently monitored in the Austin, Texas area, which had a L:W ratio of approximately 1:1; however, TSS removal in this facility was 89% Barrett et al (1997). Further, the basin did not have a sediment forebay and full basin water depth was about 8 feet. This removal is higher than normally achieved in detention basins and was the result of long residence times. Consequently, we believe that a 3:1 aspect ratio (the minimum used) will not compromise basin performance, compared to designs that are slightly longer. The Caltrans Planning and Staff Design Guide (and the Scoping Study) specify an aspect ratio of 3:1 or greater.

The three unapproved designs are inconsistent with paragraph 6.60 of the District 11 Consent Decree, which establishes "... potential for improvements in water quality ..." as a criterion. They are also non-compliant with paragraph 1.A of the District 7 Stipulation stating that, "These devices shall be designed, ... at state-of-the-art levels." We elaborate on our objections to the designs on these grounds and indicate what we will require for approval in the next series of comments. These remarks will be followed by specific comments on details of the individual designs.

GENERAL COMMENTS ON I-5/MANCHESTER, I-15/SR 78, AND I-5/LA COSTA DESIGNS

I-5/Manchester and I-15/SR 78 (Extended-Detention Basins)--District 11 Program

1. The Retrofit Pilot Projects exist to examine how best to improve the quality of runoff discharged from Caltrans facilities as a basis for decision making regarding larger scale implementation. These projects, as in any pilot study, must be executed according to the same philosophies and procedures that would apply to full implementation. It is highly inconsistent with these tenets not to seek the greatest benefit (here, water quality improvement) allowed by the prevailing circumstances, but ignoring opportunity to increase benefit is exactly what these designs do. Improving runoff water quality entails subjecting as much runoff as possible to treatment, exploiting the opportunities presented to provide treatment to the maximum within the limits imposed by actual constraints, and using the best available techniques to provide treatment. These designs fail in all three aspects (see points 2, 3, and 4, respectively).

Response: See response to specific points below.

2. A project attempting to maximize benefit would treat as much stormwater as feasible, and the prospects for doing so must be analyzed. In both of these cases it appears that runoff from more right-of-way area could be collected and delivered for treatment, and land is available for additional basin capacity:

At I-5/Manchester, runoff from the off-ramp enters from only one inlet; runoff from the mainline could be directed to the basin from another inlet, and the inlet on the ramp downstream of inlet (i) could be rerouted to the basin.

At I-15/SR 78, runoff could be collected from both mainlines and the ramp.

We recognize that redirecting these runoff streams to the basins would entail piping modifications and additional piping, both increasing cost, However, as is pointed out in later comments, we believe that some aspects are over-designed to no water quality or other real advantage, and thus offer a source of cost savings. We understand that some or all of these possibilities have already been analyzed and rejected on cost grounds. We request the results of those analyses. We are cognizant that large expenditures to collect more water, unless mitigated by savings elsewhere, would require eliminating project sites in a constant budget, a change we do not favor.

We also recognize that collecting more drainage would create the likely need to introduce influent at more than one point, an impediment to monitoring and another additional expense if multiple inlets are instrumented. However, we have not demanded that all inflows and outflows

be monitored; in fact, we have emphasized other means of judging performance. While monitoring would increase information, it does not yield a full picture of performance because of the inability to monitor all flow. Therefore, it is better to monitor some facilities of a given type more intensively than to monitor all with less coverage. In these circumstances we can not see sacrificing the main goal (learning how best to gain the most water quality benefit) to an imperfect means to that end and a secondary consideration.

Response: The I-5 Manchester (east) site drains to a downstream municipal storm drain. As such, additional flow can not be directed to this pipe that does not presently discharge there without modification to the municipal system. The single ramp inlet does pick up ramp and mainline freeway flow. Mainline flow enters the ramp system upstream. The inlet on the ramp downstream of inlet (i) would not take more discharge to the basin, since inlet (i) is designed to pick up the 1 year 24 hour runoff at this location. Larger flows (from storms with numerically greater recurrence intervals) bypass the inlet to the lower inlet as is presently the case. The Pilots are conceived and designed as 'inline' facilities and major changes to the existing Caltrans drainage system are not within the scope of the project.

The I-15/SR 78 location currently has a fairly substantial drainage area at 11.2 acres. Area from the mainline and ramp areas is intercepted. The redirection of additional flow to this site is precluded by downstream drainage diversion issues and the requirement to upsize downstream facilities as a result of any diversion. Further, routing of additional flow to his location would require jacking of storm drain under active freeway ramps and mainline.

3. A project attempting to maximize benefit would exploit all of the space that could be used to advantage, and the best allocation of the available space must be analyzed. Both of the sites in which these basins are set have more room than is proposed for use by the designs. This space could be used to treat more runoff (point 2); treat the same amount of runoff more effectively, especially by reducing the tendency toward short circuiting; or both.

Response: The sites currently use the space needed to capture and treat the design water quality volume. The basin volume was sized by capturing the entire runoff volume and releasing it over 72 hrs. As indicated above, redirecting additional flow to the sites is precluded. The length to width ratio at each site meets or exceeds the criteria stated in the Scoping Study.

4. The designs fall short of state-of-the-art levels in these respects:

Available land is not devoted to lowering the potential for flow short circuiting by dividing the basins into two or more distinct cells, with water constrained to flow from one to the other at a point.

Available land is not used to increase the flow path length between the inlet and outlet as much as practicable. The potential effectiveness of the I-5/Manchester basin, which has only a 2.9:

length:width ratio, is especially affected. The flow path can be lengthened not only by simply elongating a linear basin, but also by gradually expanding from the inlet and contracting toward the outlet, creating a serpentine form, and constructing peninsulas and islands as flow barriers.

Available space is not given to obtaining the needed volume by reducing depth and increasing water surface area, both of which have positive influences on pollutant removal efficiencies.

The basins do not have forebays, which are recognized as greatly advantageous to maintenance by concentrating the majority of the deposited sediment volume in one place. Furthermore, a forebay assists in reducing flow short circuiting to the benefit of treatment by decreasing inlet velocity and distributing flow across the basin.

Please note that the Federal Highway Administration's Evaluation and Management of Highway Runoff Water Quality (FHWA Manual), which was cited as a basis for these designs and is a state-of-the-art reference, emphasizes these features (see, for example, page 201). They must be considered and incorporated into the design in the optimal manner unless site constraints interfere.

Response:

- a) The site at Manchester (east) has a L:W ratio of 2.96:1, essentially 3:1. As indicated above, this ratio coupled with the conservative 72 hour drain time provides a sound design. The basin at SR 78/I-15 currently has a L:W ratio of about 7:1. The existing 'L' shape design is especially suited to preclude short circuiting.
- b) see response above (a).
- c) It should be noted that minimum depths for detention basins are given in several publications. A minimum depth is important to preclude resuspension of particulates. The design target depth for the basins was from 2 to 4 feet deep, consistent with published minimum depth guidelines. As indicated previously, the design volumes are conservative, as are the design drain times. Although shallower depths in sedimentation basins can theoretically improve the particle removal efficiencies, there is a very practical problem associated with shallow depths. This problem is the resuspension of previously accumulated material. Resuspension can occur during the first flush of subsequent storm events or can be the result wind and waves creating turbulence near the bottom of the basin. Consequently, determination of the "optimum" depth is a function of balancing deposition against resuspension. The literature does not offer much in the way of definitive guidance on this issue.

Young et al. (1996) have no recommendation for minimum depth; however, they specify a maximum depth based on safety factors of 1.2 m.

Dorman et al (1996) specify a minimum depth of 2 feet to prevent resuspension.

d) Basin forebays are noted in literature as a device to assist in maintenance only. They are an optional part of design if they would not be beneficial for maintenance on these projects. Given that the subject basins serve primarily impervious areas and given their relatively small size, forebays are not considered advantageous. They are not shown in the Scoping Study, nor are they given prominent discussion in the FHWA publication. Further, in the publication, "Operation, Maintenance and Management for Stormwater Management Systems", (USEPA, 1997) it is noted that forebays are provided solely to "facilitate maintenance" (pg. 7-7). The subject basins will be given high levels of maintenance and forebays are not considered advantageous.

Young et al. (1996) do not include a forebay in the basic design elements or in any of their schematic drawings. They also give no guidance on depth, size or other design criteria. It is only mentioned in one location as a feature that can facilitate sediment removal from the pond.

There have been no published reports that indicate that sediment forebays improve the pollutant removal efficiency of detention ponds. Further, the sudden expansion of flow from the inlet pipe to the pond system, when locally protected by riprap will provide good velocity reduction and distribution of flow given the long design drain time.

5. Constructing entirely of concrete serves no good purpose, has drawbacks, and is a poor use of available funds that could better go to improving treatment. Two reasons have been stated verbally for the concrete designs: to restrict groundwater at I-5/Manchester and to study maintenance with and without concrete.

Regarding the first point, going to this extent is a strong indication that the wrong device is being force-fit to the site. Before we can accept it, the site's use must be reconsidered. Its best use may be for a wet pond or constructed wetland, or for a shallower extended-detention pond with greater surface area. We are not willing to condition the future potential full-scale retrofits predicated on a pilot program based on concrete construction.

On the second issue, maintenance should be concentrated primarily near the inlet by providing a forebay. It is entirely appropriate and a good practice to place concrete on the bed of the forebay. With a forebay, sediment removal from elsewhere in the basin should be a very infrequent necessity and not warranting concrete. Sidewall erosion can be prevented with gradual side slopes (preferably 4:1 or slighter, for which space is available) and stabilization with vegetation. Vegetation may have to be reestablished and woody growth removed during maintenance. None of these factors require study; they are well known. Thus, the second reason for constructing with concrete is invalid.

Concrete has the drawback of disallowing pollutant interaction with vegetation and the soil, which takes away some pollutant removal mechanisms. With lack of any advantage, impediment to treatment, and wastefulness of funds, concrete construction should be specified only for some overriding reason. There is no such reason visible for the I-15/SR 78 facility, and I-5/Manchester may succeed better as a different type of device. If convincing reasons can not be produced to use concrete, then the basins must be earthen as far as we are concerned.

Response: The concrete basin lining serves to effectively aid in maintaining the larger basins. Vegetation growth in an un-lined basin will require extensive maintenance, and will result in vector control problems. There is simply no other way to preclude wetland type vegetation growth at the Manchester East site other than concrete lining. If the lining is omitted at the SR 78/I-15 site, maintenance needs will be significantly increased. Caltrans anticipates vegetation removal on a quarterly basis to ensure wetland type plant species do not establish, and that vector control problems do not arise. The use of lining then, is specified for ease of long-term maintenance. Finally, we do not know of any published studies showing that an earthen basin will provide better water quality results than a concrete-lined basin.

6. It appears that paved maintenance access roads are to be built around the entire basin perimeters. With a forebay, completely surrounding the basins is an unnecessary expense. The FHWA Manual, in fact, recommends access only to the forebay and outlet (page 202). We object to conventional asphalt paving because of its unnecessary impervious surface and cost. The FHWA Manual specifies a solid driving surface but names materials other than impermeable ones. Paving blocks that allow vegetation growth and water penetration would be a good choice. We will agree with the proposed "gold-plated" maintenance access only if cost is not used as a reason to discard provisions that improve treatment.

Response: Access around the entire basin is required for vector control, maintenance of the basin side slopes and invert, and for mobility of the vehicles (to avoid backing up into offramps/freeway mainline). Referencing the Planning & Design Staff Guide, access should consist of "a permanent area to be provided around the perimeter of the impoundment to allow maintenance." All types of vehicles will require access to the sites during the study and during all kinds of weather conditions. Asphalt paving is the most effective material for this type of maintenance/monitoring access.

Pavers will be substituted if desired, however, be advised that we estimate they would cost between 3 to 4 times as much asphalt (on a per square foot basis). The labor necessary to install pavers is very intensive. Further, maintenance would be increased to control vegetation in the area of the pavers.

7. A project attempting to maximize benefit and gain acceptance if implemented on a large scale would be structured to minimize objections that might be raised by the public. The public

may very well object to features that are designed with no consideration of appearance whatever, as these facilities are. Although appearance may be less important along a highway than in a neighborhood, current design philosophy is to make as good an appearance as possible without detracting from more fundamental objectives. Fortunately, good appearance is generally consistent with good water quality performance. Irregular geometry such as recommended above, generally fitting with the site contours, and using vegetation instead of concrete are all conducive to performance as well as appearance. We will not countenance these projects being designed in a way that risks public disapproval unless there are overriding reasons for doing so. As none are apparent, they must be redone to make a better appearance.

Response: The 78/15 Extended Detention Basin (EDB) was located in a depression between highway connectors that are superelevated away from the site. The I-5/SR 56 EDB was located below the highway connector and above the local roadway. In short, both basins were designed out of public view. The purpose of the pilot studies is to construct BMP facilities. The site design does accommodate the contours of the land and conforms to the natural features of the topography. Care was taken to avoid wetlands areas (La Costa) and all slope contours were rounded. Again, considering the care taken to avoid short-circuiting using conservative L:W ratios and drain times, the designs are consistent with state-of-the-art guidelines for removal efficiency.

8. To summarize what is needed for our approval, the most appropriate type of device for I-5/Manchester must be established. Then, these sites must be reanalyzed to allocate the available land in the optimal way to maximize the water quality benefits considering: (1) how much runoff can feasibly be collected for treatment, (2) multi-celled arrangements, (3) increasing flow path lengths, and (4) decreasing depths for given volume and thereby increasing water surface areas. The basins must have forebays and be of earthen construction instead of concrete, unless a convincing argument can be made for concrete. Appearance designed to maximize public acceptance must be incorporated in the designs.

Response: The Manchester East site is appropriate for an Extended Detention Basin and follows state-of-the-art design guidelines for detention time and L:W ratio. The concrete lining is specified to mitigate maintenance concerns at this site. The site at Manchester West is preferred for a Wet Basin due to better proximity to the ground water table. Another Wet Basin pilot is not appropriate given the uncertainties of using brackish groundwater to support the Wet Basin system. Additional runoff can not be directed to this site to avoid downstream diversion problems. Further, jacking of storm drain would be required to direct additional flow to this location. As the basin is cut into the existing ground, it will be substantially hidden from view.

I-5/La Costa (Infiltration Basin)--Districts 7 and 11 Programs

This design has the same types of faults as the extended-detention basins, as follows:

1. It misses runoff that might be treated, does not make the best use of available space, and is not entirely consistent with state-of-the-art design standards (see points 2, 3, and 4, respectively).

Response: Additional effort was made at this site to bring runoff in from the freeway mainline. A storm drain extension is shown on the construction plans. Bringing additional flow to this site would require jacking of pipe under the active roadway.

2. It appears that additional mainline drainage could be included. We recognize the same issues surrounding adding runoff as explored above and have the same feelings about them expressed there.

Response: See response to Comment No. 1 under "Conclusion of Review".

3. There is additional space that could be used to treat more runoff (point 2), reduce the risk of failure as an infiltration device (see point 4), or both.

Response: There is not additional space available at this site. Spacing at the site is constrained. Directly south of the basin location is a depression that has been evaluated by the field biologist as a wetland. This is also true directly west of the basin location. North of the basin site are several large palms which Caltrans has chosen not to remove, wetlands begins to the north in close proximity to the palms. Consequently, the basin is located on the only portion of the site that would not require permitting with the US Army Corps of Engineers and associated mitigation.

4. The design provides no pretreatment, which is a state-of-the-art recommendation and could be provided as a presettlement basin in the space available. Minimizing sediment loading is especially important with the relatively low infiltration rate at this site. Also because of the relatively slow rate, it would be best to improve infiltration quantity by exposing water more directly to the soil by designing a shallower, more expansive basin. The space allocation must be reconsidered in light of these points.

Response: The basin treats flow, which is nearly 100% from impervious area. The need for pretreatment at this location was not considered necessary. A high level of maintenance will ensure the percolation rate is maintained. Young et al recommend a sediment forebay or riprap apron to reduce flow velocities in infiltration basins. The design specifies a energy dissipation device, we are in general compliance with Young's guidance.

5. The same comments on maintenance access road and appearance stated for the two extended-detention ponds also apply to this site.

Response: The basin is depressed below grade and will not be visible. It will be stabilized with a hydroseed mix. The access road is necessary to completely encircle the basin to allow trucks and equipment to leave the site without backing. It is prohibited to have vehicles back into traffic. A 50' by 50' turn around may be substituted in lieu of a maintenance road encircling the basin, but other considerations also apply. Vector control may dictate access from the entire perimeter of the basin and the nature and degree of observation associated with this pilot study would also indicate the need for good access to all perimeter locations.

SPECIFIC COMMENTS ON I-5/MANCHESTER (EXTENDED-DETENTION BASIN)--DISTRICT 11 PROGRAM

1. The location of the water quality "man-way" (come on, guys, it's a person-way in the late '90s) is ambiguous.

Response: The location is fixed per global coordinates based Caltrans control.

2. Details on the perimeter swale are unclear.

Response: The perimeter swale is a 4' wide by 1' deep earthen swale intended to divert offsite water around the basin.

3. The outlet piping run is very long, and it would be better to use the space surrounding this run to improve the design for performance benefits, as pointed out above.

Response: The long outlet piping is required to avoid the sewage lift station "overflow" pond that is activated when problems with the sewer system occur downstream of the existing lift station. The lower portion of the site is not available for use due to the local sewer district facilities and emergency operation plan.

4. Landscaping must be fully specified if this basin becomes earthen instead of concrete.

Response: Comment noted. Hydroseed will be specified if the basin becomes earthen. See response to Comment #5 under general comments.

SPECIFIC COMMENTS ON I-15/SR 78 (EXTENDED-DETENTION BASIN)--DISTRICT 11 PROGRAM

1. It is not clear if the two external surface drains will be regraded to the most favorable slope to drain well and avoid erosion and will be vegetated, as they should be.

Response: The two external surface drains are risers to direct water into the storm drain system from the adjacent low points that will occur next to the basin. Good drainage will be provided and the area will be revegetated.

2. Landscaping must be fully specified if this basin becomes earthen instead of concrete.

Response: Concrete is required to facilitate effective maintenance of this basin both from a vegetation and a vector control standpoint. See response to Comment #5 under general comments.

SPECIFIC COMMENTS ON I-5/SR 56 (EXTENDED-DETENTION BASIN)--DISTRICT 11 PROGRAM

This design is tentatively approved pending mutual agreement on the following issues:

1. We recommend moving the foot of the berm intended to increase the flow path length toward the outlet, closer to the end of the maintenance ramp, to allow for construction of a forebay and, possibly, a larger inlet energy dissipater.

Response: A forebay is not necessary for reasons cited previously. Additionally all of the inflow is from asphalt surfaces, which has little sediment production.

2. The construction of the overflow spillway is unclear. If it is concrete, flow will accelerate to the point where it could be erosive when entering the discharge ditch. Therefore, it should be rip-rap. Both the spillway and the regular outlet pipe should discharge into an armored channel.

Response: The outlet (proposed and existing) is beyond the Caltrans right-of-way, and currently flows into a rip-rap area by an agreement with the adjacent landowner. No major reconstruction of the outlet is permitted by the landowner.

3. We recommend that some permeable surface be specified for the maintenance access road, as we also did for the other basins.

Response: The asphalt maintenance access road is the best option for the sites because of the all-weather use intended by both passenger vehicles and larger maintenance vehicles. However, pavers will be substituted at the Plaintiffs request.

4. The side slopes are ambiguous between plans D-2 and D-23.

Response: The side slopes are supposed to be 4:1 and will be built with the cross sections shown on the plan.

5. Landscaping must be fully specified. The berm along Sorrento Valley Road should be landscaped with native shrubs and ground cover to blend with the adjacent estuary.

Response: An erosion control seed mix as specified in the special provisions will be used on graded surfaces. Landscaping is specified on an in-kind replacement basis.

6. What does this statement in the one-page memorandum titled Caltrans District 11 BMP Retrofit Program and dated April 7, 1998 mean: "... the basin is considered a temporary facility ..." If it is not intended that this basin stay in operation if it functions effectively, that is a violation of the spirit if not the letter of the Consent Decree. The plaintiffs wanted the potential to improve water quality as a criterion in paragraph 6.60 of the Decree, so that pilot devices could start immediately to reduce pollutant releases. We do not agree to any plan for this or any other pilot in District 11 to be regarded a priori as temporary.

Response: This issue is a misunderstanding. The current basin at the site was constructed as temporary, the comment was not intended to refer to the proposed pilot project.

7. As we stated earlier, we do not favor concrete basin construction. Still, we see it as ironic that this basin is specified for earthen construction, while the other two extended-detention basins are to be concrete. If concrete should be considered at all, it should be for the basin in this space-limited location, where it could increase capacity to the advantage of treatment by allowing steeper side slopes. If Caltrans has a strong feeling about trying concrete construction, we will discuss it for this basin but can not understand rejecting it here and using it in the more spacious areas.

Response: The small size of this basin is a better application for the use of a non-concrete lined design because maintenance will be less, due to relatively small side slopes and compact design. Note that the vegetation in the basin invert is expected to be removed at least quarterly to prohibit wetlands type characteristics from occurring. This is in contrast to concrete lining which will eliminate this maintenance need.

SPECIFIC COMMENTS ON I-5/LA COSTA (INFILTRATION BASIN)--DISTRICTS 7 AND 11 PROGRAMS

1. We think that the intended mode of operation of this basin, allowing flows in excess of design to over-top in an uncontrolled way, is very strange and inimical to good performance. We recommend that the facility be designed as an off-line device, where excess flow is routed around it. The intended operation risks considerable wear on the sidewalls and resuspension of trapped sediments.

Response: The facility has been designed as an offline device. Restrictor plates located at the drain inlets serving this basin have been specified to limit the peak flow to the basin to that of the one year 24-hour storm. Larger storm events bypass the facility and flow through existing storm drains directly to the lagoon.

2. It is very important to detail the construction of an infiltration basin, which the plans do not do. Poor construction techniques can ruin a surface for infiltration by compaction and other effects. These specifications must be made clear and complete. RBF was sent references that detail these points, in particular a course manual titled Infiltration Facilities for Stormwater Quality Control that has a list of 13 construction recommendations on pages 33 and 34.

Response: These specifications will be reviewed and incorporated into the design package.

3. Landscaping must be fully specified.

Landscaping will consist of a hydroseed application to stabilize slopes. It is Caltrans policy to replace only existing landscaping that is disturbed during construction.

4. Design specifications must be added for the cut-off swale along the steep slope.

Response: The swale is shown on the construction drawings per Caltrans standard practice.

FINAL COMMENTS

We are aware that our failure to approve three of the designs risks delaying their completion past this year, although we hope that issues can be resolved and necessary changes made in time to keep them on schedule. However, it is more important to us that the facilities be given every chance to succeed as treatment devices that is allowed by current knowledge, the sites, and the budget. Thus, we are unwilling to approve designs that we do not believe meet that standard for the sake of schedule.

It appears to us that these projects were approached more as standard highway designs than environmental control developments, perhaps because of the experience of the designers or

restraints by Caltrans against applying the precepts of state-of-the-art stormwater treatment facility design. Designing in this arena involves working with land forms and characteristics and organic substances to maximize water quality benefits by exploiting a host of physical, chemical, and biological mechanisms that capture and transform pollutants. It thus requires an interdisciplinary team with expertise in the relevant geophysical and biological sciences. Landscape personnel also have a role in guiding the design toward the best possible appearance. The design team must add this expertise if it does not now have it, and Caltrans must unleash the team to do well conceived state-of-the-art designing, or we are going to have a very long haul in getting through these programs. It is not our purpose or joy to have to hold back approval or deliver negative comments, as we have to do all too much in the implementation of the court orders. We would much rather be able to say, "Great job, let's go with it."

Response: Our recommendations are based on a number of studies and we have developed the design guidelines based on the factors that appear to have the most impact on basin performance. Consequently, we believe that the proposed retrofit designs qualify as state-of-the art. The goal of this research is to establish the benefit of a suite of BMPs for use by Caltrans. Given that we have agreed on standard designs citing current literature for evaluation, the costs, benefits and feasibility of these structures are clearly established for potential broad base application. Our efforts have been guided by a noted expert in the field of stormwater quality management, Dr. Michael Barrett.

We propose to move the Pilot at the Manchester East site to the Contingency Track to allow sufficient time to address the comments raised herein. Further, there would appear to be a question as to the necessity to construct this site pending results from bidding of the other projects relative to the required \$2.5 million construction cost, moving this Pilot Project to the contingency track would allow more time for this evaluation.

Please contact me relative to the possibility of setting a meeting to further discuss these issues during the week of the 27th. I look forward to hearing from you soon.

Sincerely,

Scott Taylor, P.E. Project Manager

Pc Christopher May

Jeremy Johnstone, USEPA Region 9

Mr. David Beckman, Esq., NRDC

Mr. Terry Tamminen, Santa Monica BayKeeper - MALL P.D. Bo

Mr. Ken Moser, San Diego BayKeeper

Mr. Steven Borroum, Caltrans

Ms. Yulya Davidova, Caltrans

References:

Barrett, Michael E., Keblin, Michael V., Walsh, Patrick M., Malina, Joseph F., Jr., Charbeneau, Randall J., 1997, Evaluation of the Performance of Permanent Runoff Controls: Summary and Conclusions, Draft Research Report 2954-3F, Center for Transportation Research, University of Texas at Austin.

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ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

LETTER OF TRANSMITTAL

TO:	Larry Walker & Associates 509 Fourth Street Davis, CA 95616			DATE: RBF JOB NO.: REFERENCE:	April 22, 1998 34358 Caltrans	
•				DESCRIPTION:	Correspondence	
ATTN:	TTN: Nimi Mahadevan			-		
SENT TO	YOU VIA:	X Mail Fax	Messenger Modem	Blueprinter Your Pick-Up	Overnight Delivery	
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1	Correspondence to Richard Horner, April 22, 1998					
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		Debi Blake, Secretary Water Resources				
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APPENDIX B

Appendix B

Draft MEMORANDUM OF UNDERSTANDING

California Department of Transportation's
Best Management Practices Retrofit Pilot Program
In District 7, Los Angeles
And
District 11, San Diego

I. APPLICABILITY

- A. This memorandum of understanding (MOU) applies to all Best Management Practice (BMP) Retrofit Pilot Project sites located in both California Department of Transportation (Caltrans) District 7 (Los Angeles) and District 11 (San Diego).
- B. Nothing in this MOU or its Appendices is intended to diminish, modify, or otherwise affect the statutory or regulatory authorities of the agencies involved.

II. BACKGROUND

As a result of litigation between Caltrans, the National Resources Defense Council (NRDC), and the Santa Monica Baykeeper, a Stipulation in District 7 (Los Angeles) and Consent Decree in District 11 (San Diego), with the US EPA and San Diego Baykeeper as additional Plaintiffs, was reached outlining the development of a Best Management Practice (BMP) Retrofit Pilot Program. The BMP Retrofit Pilot Program includes the design, construction and monitoring of BMP pilot projects within the urbanized areas of Los Angeles County and San Diego County. The types of proposed BMP pilot projects within the Districts include extended detention basins, infiltration basins, biofiltration strips/swales, a wet basin, trapping catch basins, catch basin inserts, multi-chambered treatment train (MCTT), infiltration trenches, biofilters, oil/water separator and media filter. The BMP Retrofit Pilot Program will allow for observations pertaining to technical feasibility, cost of retrofitting, and benefits of various BMPs for treating runoff from Caltrans highways and facilities.

<u>Project Objectives</u>. For each pilot project site, Caltrans will design, construct, maintain and monitor the BMP system. The objectives of the program will be as follows:

- 1. Determine the feasibility of design, construction and maintenance of the selected BMPs;
- 2. Evaluate the performance of the selected BMPs in removing constituents of concern in highway storm water runoff; and
- 3. Evaluate the frequency and magnitude of operational problems associated with maintenance of the structures and safety concerns specific to transportation facilities.

<u>Timing</u>. It is anticipated that a significant number of the BMP pilot projects will be constructed and operational by December 1998, the remaining projects will be constructed by December 1999. The BMP Retrofit Pilot Program will be active for a minimum of two (2) years. During this two-year period, the benefits of various BMPs for treating runoff from Caltrans highways and facilities will be evaluated. Caltrans may extend the evaluation period, if determined necessary. Once the program is concluded, Caltrans will decommission the BMPs. Determination of a widespread deployment of the BMP devices to Caltrans facilities will be the subject of a follow-up study and subsequent review.

III. PURPOSE OF MOU

Potential vector control issues are foreseen at some of the BMP sites in Caltrans' Retrofit Pilot Program at sites in Los Angeles County and San Diego County. It's the intent of this MOU to define the responsible party and roles for all work related to the operation, maintenance and monitoring of each BMP site and how it relates to implementation of vector control strategies.

By signing this MOU, it is understood that the BMP Retrofit Pilot Program will be operated under the guidelines established in the Operation, Maintenance and Monitoring (OM&M) Manual during the time period in which the BMP sites are considered to be active. Details of vector control programs developed as part of the BMP Retrofit Pilot Program will be discussed with the agencies charged with vector control. Caltrans will be responsible for all vector control at each site.

It is Caltrans desire to establish this MOU between the following agencies: California State Department of Health Services, Greater Los Angeles County Vector Control Districts, San Gabriel Valley Mosquito & Vector Control Districts, County of San Diego Department of Environmental Health and Los Angeles County West Vector Control District.

IV. ANTICIPATED BENEFITS OF MOU

The process embodied in this MOU will:

- 1. Improve cooperation and efficiency of governmental operations at all levels, thereby better serving the public,
- 2. Enable the BMP Retrofit Pilot Program to proceed on schedule, and
- 3. BMPs will remove constituents of concern from storm water runoff, thus providing a benefit to the region's aquatic ecosystems and the public interest.

V. IMPLEMENTATION PROCEDURES

In order to maintain each site so that objectives of the program are met and that the concerns of the Vector Abatement Districts and Health Departments are adequately addressed, the following conditions shall be agreed to by each party upon signature of this MOU:

- A. Caltrans shall operate and maintain the BMP sites per guidelines established as part of the BMP Retrofit Pilot OM&M Manual.
- B. Should any significant revisions be required to the BMP Retrofit Pilot Program and/or OM&M Manual effecting this MOU, Caltrans shall inform, in writing, the signatories for their comment.
- C. Caltrans shall coordinate with the Vector Control Abatement Districts and Health Departments to receive input regarding the design and maintenance of the sites/structures as it relates to vector control.
- D. In order to implement and meet all the objectives of the BMP Retrofit Pilot Program and develop reliable data, it is critical that Caltrans maintain the proposed BMP sites on a routine basis during the life of the program. Maintenance activities will be conducted in accordance with the guidelines established as part of the OM&M Manual. As part of maintenance activities, Caltrans will take full responsibility for vector control at the sites.
- E. Caltrans shall provide periodic status reports to signatories. The reports shall contain sufficient data that allows signatories to assess the effectiveness of vector control strategies. Vector Control Abatement Districts and Health Departments shall provide written comments on the reports to Caltrans within 30 days of receipt of reports.
- F. It is understood that if Caltrans abandons a site, fails to communicate with agencies identified within this MOU, or fails to follow the guidelines as outlined in the OM&M Manual, any activity within these facilities would be subject to the laws/regulations of those agencies with the charge of implementing such laws and regulations.

VI. CONCURRENCE/NON-CONCURRENCE

- A. Agencies concur with project procedures unless there is significant new information or significant changes to the project, the environment, or laws and regulations.
- B. Agencies agree to provide in writing an explanation of the basis for any non-concurrence. All agencies agree to attempt to resolve issues causing non-concurrence, and to try to do so informally before entering formal dispute resolution.

VII. DISPUTE RESOLUTION

Initiated upon request of any signatory agency. Reasons may include:

- 1. Unresolved written non-concurrence,
- 2. Lack of response within agreed-upon time limits, and
- 3. Substantive departure from the MOU.

See Attachment A, Dispute Resolution.

VIII. MODIFICATION/TERMINATION

This MOU may be modified upon approval of all signatories. Modification may be proposed by one or more signatories. Proposals for modification will be circulated to all signatories for a 30-day period of review. Approval of such proposals will be indicated by written acceptance. A signatory may terminate participation in this agreement upon written notice to all other signatories.

Charles Myers	Date
California State Department of Health Services	
•	
Jack Hazelrigg	Date
Greater Los Angeles County Vector Control District	
Sue Zuhlke	Date
San Gabriel Valley Mosquito & Vector Control District	
Moise Mizrahi	Date
County of San Diego, Department of Environmental Health	
David Heft	Date
Los Angeles County West Vector Control District	
James W.Van Loben Sels, Director	Date
California Department of Transportation	

Attachment A

DISPUTE RESOLUTION

I. INTRODUCTION

The purpose of this dispute resolution procedure is to provide a process to resolve disagreements between signatory agencies. The intention is to expeditiously resolve disputes at the lowest level of the organizations through consensus. Alternative dispute resolution processes (e.g., facilitation or mediation) can be used.

II. LEVELS OF DISPUTE RESOLUTION

A. Informal dispute resolution

- 1. "Informal dispute resolution" is agency staff and mid-level management coordination between parties to resolve the issue.
- 2. Informal dispute resolution can be initiated by any signatory agency.
- 3. All normal and reasonable coordination options need to be exhausted before formal dispute resolution is initiated.

B. Formal dispute resolution

- 1. If the parties agree that the informal dispute resolution process has been exhausted, the formal dispute resolution process can be initiated.
- 2. The signatory agencies will convene in a meeting within 45 days to resolve the issue.
- 3. The inviting signatory agency who initiates the formal dispute resolution process will include a statement of issue and any pertinent background material in the invitation.
- 4. The written conclusion of the formal process will be distributed to all signatory parties.

APPENDIX C

MEMORANDUM OF UNDERSTANDING

California Department of Transportation's
Best Management Practices Retrofit Pilot Program
In District 7, Los Angeles
And
District 11, San Diego

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<u>Project Objectives</u>. For each pilot project site, Caltrans will design, construct, maintain and monitor the BMP system. The objectives of the program will be as follows:

- 1. Determine the feasibility of design, construction and maintenance of the selected BMPs;
- 2. Evaluate the performance of the selected BMPs in removing constituents of concern in highway storm water runoff; and
- 3. Evaluate the frequency and magnitude of operational problems associated with maintenance of the structures and safety concerns specific to transportation facilities.

<u>Timing</u>. It is anticipated that a significant number of the BMP pilot projects will be constructed and operational by December 1998, the remaining projects will be constructed by December 1999. The BMP Retrofit Pilot Program will be active for a

minimum of two (2) years. During this two-year period, the benefits of various BMPs for treating runoff from Caltrans highways and facilities will be evaluated. Caltrans may extend the evaluation period, if determined necessary. Once the program is concluded, Caltrans will decommission the BMPs. Determination of a widespread deployment of the BMP devices to Caltrans facilities will be the subject of a follow-up study and subsequent regulatory review.

III. PURPOSE OF MOU

In order to implement all the objectives of the BMP Retrofit Pilot Program and develop reliable data, it is critical that Caltrans be able to maintain the proposed BMP sites on a periodic basis during the life of the program. Detailed maintenance procedures will be developed as part of the Operation, Maintenance and Monitoring (OM&M) Manual developed for the BMP Retrofit Pilot Program.

During the site planning process it was determined that none of the BMP locations impact jurisdictional "waters of the U.S.," including special aquatic sites (i.e. wetlands) per Section 404 of the Clean Water Act. Also, it is understood that non-tidal drainage ditches on dry land and artificial ponds on dry land used for settling basins are not considered "waters of the U.S."

Caltrans is concerned that if an agreement (i.e., MOU) with regulatory agencies is not established and a BMP site begins to exhibit wetland characteristics, that an agency may take jurisdiction over the BMP site and limit or restrict maintenance activities required to meet the objectives of the program. It is the intent of this MOU to allow Caltrans to operate and maintain each BMP site under the guidelines established in the OM&M Manual during the time period in which the BMP Retrofit Pilot Program is active.

It is Caltrans desire to establish this MOU regarding jurisdictional authority between the following agencies: Army Corps of Engineers (ACOE), United States Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Regional Water Quality Control Board (RWQCB) and the California Department Fish and Game (CDFG).

IV. ANTICIPATED BENEFITS OF MOU

The process embodied in this MOU will:

- 1. Improve cooperation and efficiency of governmental operations at all levels, thereby better serving the public,
- 2. Enable the BMP Retrofit Pilot Program to proceed on schedule, with needed maintenance activities conducted on a periodic basis with no delays, and
- 3. BMPs will remove constituents of concern from storm water runoff, thus protecting and enhancing the waters of the U.S. that would receive the runoff, and providing a benefit to the region's aquatic ecosystems and the public interest.

V. IMPLEMENTATION PROCEDURES

In order to maintain each site so that objectives of the program are met and that jurisdictional authority is not compromised, the following conditions shall be implemented upon signature of this MOU:

- A. Caltrans shall operate and maintain the BMP sites per guidelines established as part of the BMP Retrofit Pilot OM&M Manual.
- B. Should any revisions be required to the BMP Retrofit Pilot Program and/or OM&M Manual, Caltrans shall inform, in writing, the signatories.
- C. At the time that BMP sites are selected to be decommissioned, the signatories will be notified, in writing, prior to initiation of activities to perform such work.
- D. It is understood that if Caltrans abandons the sites, fails to communicate with Regulatory Agencies as outlined in this MOU, or fails to follow the guidelines as outlined in the OM&M Manual, any activity within these facilities would be subject to the regulations of the Clean Water Act, if applicable.

VI. CONCURRENCE/NON-CONCURRENCE

- A. Agencies concur with project procedures unless there is significant new information or significant changes to the project, the environment, or laws and regulations.
- B. Agencies agree to provide in writing an explanation of the basis for any non-concurrence. All agencies agree to attempt to resolve issues causing non-concurrence, and to try to do so informally before entering formal dispute resolution.

VII. DISPUTE RESOLUTION

Initiated upon request of any signatory agency. Reasons may include:

- 1. Unresolved written non-concurrence,
- 2. Lack of response within agreed-upon time limits, and
- 3. Substantive departure from the MOU.

See Appendix A, Dispute Resolution.

VIII. MODIFICATION/TERMINATION

This MOU may be modified upon approval of all signatories. Modification may be proposed by one or more signatories. Proposals for modification will be circulated to all signatories for a 30-day period of review. Approval of such proposals will be indicated by written acceptance. A signatory may terminate participation in this agreement upon written notice to all other signatories.

APPENDIX D

Appendix C

DRAFT MEMORANDUM OF UNDERSTANDING

California Department of Transportation's
Best Management Practices Retrofit Pilot Program
In District 7, Los Angeles
And
District 11, San Diego

I. APPLICABILITY

- A. This memorandum of understanding (MOU) applies to all Best Management Practice (BMP) Retrofit Pilot Project sites located in both California Department of Transportation (Caltrans) District 7 (Los Angeles) and District 11 (San Diego).
- B. Nothing in this MOU or its Appendices is intended to diminish, modify, or otherwise affect the statutory or regulatory authorities of the agencies involved.

II. BACKGROUND

As a result of litigation between Caltrans, the National Resources Defense Council (NRDC), and the Santa Monica Baykeeper, a Stipulation in District 7 (Los Angeles) and Consent Decree in District 11 (San Diego), with the US EPA and San Diego BayKeeper as additional Plaintiffs, was reached outlining the development of a Best Management Practice (BMP) Retrofit Pilot Program. The BMP Retrofit Pilot Program includes the design, construction and monitoring of BMP pilot projects within the urbanized areas of Los Angeles County and San Diego County. The types of proposed BMP pilot projects within the Districts include extended detention basins, infiltration basins, biofiltration strips/swales, a wet basin, trapping catch basins, catch basin inserts, multi-chambered treatment train (MCTT), infiltration trenches, biofilters, oil/water separator and media filter. The BMP Retrofit Pilot Program will allow for observations pertaining to technical feasibility, cost of retrofitting, and benefits of various BMPs for treating runoff from Caltrans highways and facilities.

<u>Project Objectives</u>. For each pilot project site, Caltrans will design, construct, maintain and monitor the BMP system. The objectives of the program will be as follows:

- 1. Determine the feasibility of design, construction and maintenance of the selected BMPs;
- 2. Evaluate the performance of the selected BMPs in removing constituents of concern in highway storm water runoff; and
- 3. Evaluate the frequency and magnitude of operational problems associated with maintenance of the structures and safety concerns specific to transportation facilities.

<u>Timing</u>. It is anticipated that a significant number of the BMP pilot projects will be constructed and operational by December 1998, the remaining projects will be constructed by December 1999. The BMP Retrofit Pilot Program will be active for a minimum of two (2) years. During this two-year period, the benefits of various BMPs for treating runoff from Caltrans highways and facilities will be evaluated. Caltrans may extend the evaluation period, if determined necessary. Once the program is concluded, Caltrans will decommission the BMPs. Determination of a widespread deployment of the BMP devices to Caltrans facilities will be the subject of a follow-up study and subsequent regulatory review.

III. PURPOSE OF MOU

The purpose of this MOU is to establish that the BMP sites will not be subject to regulations of the Clean Water Act pertaining to jurisdictional "waters of the U.S." during the time they are operated under the BMP Retrofit Pilot Program.

In order to implement all the objectives of the BMP Retrofit Pilot Program and develop reliable data, it is critical that Caltrans be able to maintain the proposed BMP sites on a routine basis during the life of the program. Detailed maintenance procedures will be established as part of the Operation, Maintenance and Monitoring (OM&M) Manual developed for the BMP Retrofit Pilot Program.

During the site planning process it was determined that none of the BMP locations impact jurisdictional "waters of the U.S.," including special aquatic sites (i.e. wetlands) per Section 404 of the Clean Water Act. Also, it is understood that non-tidal drainage ditches on dry land and artificial ponds on dry land used for settling basins are not considered "waters of the U.S."

Caltrans is concerned that if an agreement (i.e., MOU) with regulatory agencies is not established and a BMP site begins to exhibit wetland characteristics, that an agency may take jurisdiction over the BMP site and limit or restrict maintenance activities required to meet the objectives of the program. It is the intent of this MOU to allow Caltrans to operate and maintain each BMP site under the guidelines established in the OM&M Manual during the time period in which the BMP Retrofit Pilot Program is active.

It is Caltrans desire to establish this MOU regarding jurisdictional authority between the following agencies: Army Corps of Engineers (ACOE), United States Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Regional Water Quality Control Boards (RWQCBs) and the California Department Fish and Game (CDFG).

IV. ANTICIPATED BENEFITS OF MOU

The process embodied in this MOU will:

1. Improve cooperation and efficiency of governmental operations at all levels, thereby better serving the public,

- 2. Enable the BMP Retrofit Pilot Program to proceed on schedule, with needed maintenance activities conducted on a routine basis with no delays, and
- 3. BMPs will remove constituents of concern from storm water runoff, thus protecting and enhancing the waters of the U.S. that would receive the runoff, and providing a benefit to the region's aquatic ecosystems and the public interest.

V. IMPLEMENTATION PROCEDURES

In order to maintain each site so that objectives of the program are met and that jurisdictional authority is not compromised, the following conditions shall be implemented upon signature of this MOU:

- A. Caltrans shall operate and maintain the BMP sites per guidelines established as part of the BMP Retrofit Pilot OM&M Manual.
- B. Should any significant revisions be required to the BMP Retrofit Pilot Program and/or OM&M Manual effecting this MOU, Caltrans shall inform, in writing, the signatories.
- C. At the time that BMP sites are selected to be decommissioned, the signatories will be notified, in writing, prior to initiation of activities to perform such work.
- D. It is understood that if Caltrans abandons the sites, fails to communicate with Regulatory Agencies as outlined in this MOU, or fails to follow the guidelines as outlined in the OM&M Manual, any activity within these facilities would be subject to the regulations of the Clean Water Act and the Fish and Game Code of California, if applicable.

VI. CONCURRENCE/NON-CONCURRENCE

- A. Agencies concur with project procedures unless there is significant new information or significant changes to the project, the environment, or laws and regulations.
- B. Agencies agree to provide in writing an explanation of the basis for any non-concurrence. All agencies agree to attempt to resolve issues causing non-concurrence, and to try to do so informally before entering formal dispute resolution.

VII. DISPUTE RESOLUTION

Initiated upon request of any signatory agency. Reasons may include:

- 1. Unresolved written non-concurrence,
- 2. Lack of response within agreed-upon time limits, and
- 3. Substantive departure from the MOU.

See Attachment A, Dispute Resolution.

VIII. MODIFICATION/TERMINATION

This MOU may be modified upon approval of all signatories. Modification may be proposed by one or more signatories. Proposals for modification will be circulated to all signatories for a 30-day period of review. Approval of such proposals will be indicated by written acceptance. A signatory may terminate participation in this agreement upon written notice to all other signatories.

Mark Durham, Chief, South Section U.S. Army Corps of Engineers	Date
David Castanon, Chief, North Section U.S. Army Corps of Engineers	Date
Jeff Rosenbloom, Chief U.S. Environmental Protection Agency, Region IX	Date
Nancy Gilbert U.S. Fish and Wildlife Service	Date
U.S. Pish and whethe Service	
John Bradley U.S. Fish and Wildlife Service	Date
Terry Dickerson California Department of Fish and Game	Date
James W.Van Loben Sels, Director California Department of Transportation	Date

Attachment A

DISPUTE RESOLUTION

I. INTRODUCTION

The purpose of this dispute resolution procedure is to provide a process to resolve disagreements between signatory agencies. The intention is to expeditiously resolve disputes at the lowest level of the organizations through consensus. Alternative dispute resolution processes (e.g., facilitation or mediation) can be used.

II. LEVELS OF DISPUTE RESOLUTION

A. Informal dispute resolution

- 1. "Informal dispute resolution" is agency staff and mid-level management coordination between parties to resolve the issue.
- 2. Informal dispute resolution can be initiated by any signatory agency.
- 3. All normal and reasonable coordination options need to be exhausted before formal dispute resolution is initiated.

B. Formal dispute resolution

- 1. If the parties agree that the informal dispute resolution process has been exhausted, the formal dispute resolution process can be initiated.
- 2. The signatory agencies will convene in a meeting within 45 days to resolve the issue.
- 3. The inviting signatory agency who initiates the formal dispute resolution process will include a statement of issue and any pertinent background material in the invitation.
- 4. The written conclusion of the formal process will be distributed to all signatory parties.



May 11, 1998 -

Vicki Kramer, Ph.D., Chief Vector-Borne Disease Section Division of Communicable Disease Control California Department of Health Services 601 North 7th Street, MS 486 P.O. Box 942732 Sacramento, CA 94234-7320

Dear Vicki:

At its meeting on May 8th, 1998, the Board of Directors of the MVCAC adopted a resolution expressing its concern over the planned construction of water retention devices in southern California by the California Department of Transportation (CAL TRANS). The types of devices being proposed by CAL TRANS as Best Management Practices can be expected to produce substantial numbers of mosquitoes of species that are capable of transmitting viruses such as Western Equine Encephalomyelitis (WEE) and St. Louis Encephalitis (SLE) which can cause serious human illness and even death. Mosquito species capable of transmitting human malaria could also be produced in these proposed impoundments. Studies in Florida and elsewhere have shown that water retained in structures of the types proposed by CAL TRANS can be expected to produce a variety of mosquito species. A high percentage of such structures can be expected to produce mosquitoes.

Placement of such devices at highway interchanges will inevitably place them in close proximity to humans, thereby increasing their exposure to mosquitoes and the diseases they may carry. Local mosquito and vector control agencies having responsibilities to protect the public from mosquitoes and these diseases will be faced with the burden of inspecting and providing inspection and needed control measures. Under the California Health and Safety Code they may choose to issue notices requiring the responsible agency or property owner to abate the production of mosquitoes on those sites.

We therefore urge you to work with CAL TRANS and to involve technical staff from our member agencies to determine the best methods of preventing both the contamination of waterways and the prevention of mosquitoes caused by the CAL TRANS projects.

Sincerely.

Donald A. Eliason, Dr.P.H., Executive Director

CC.

J. Steven Borroum
Marriane E. Larson
Howard A. Yamaguchi
Dean F. Messer

May 8, 1998

Mosquito and Vector Control Association of California

Resolution Regarding Water Retention Devices Proposed by the California Department of Transportation

The Board of Directors of the Mosquito and Vector Control Association of California hereby adopts the following recitais, resolutions, and statements:

WHEREAS, the Mosquito and Vector Control Association of California is an association of mosquito and vector control districts and agencies charged with the enforcement of those sections of the California Health and Safety Code pertaining to the control of mosquitoes and other vectors, up to and including the issuance of abatement notices; and

WHEREAS, the aforementioned vectors can affect the public health by transmitting disease and causing human discomfort or injury, and

WHEREAS, the California Department of Transportation has been ordered to evaluate and implement methods to ensure that polluted runoff water from roadways and maintenance yards within their jurisdiction is precluded from discharges into waterways; and

WHEREAS, the types of devices listed as Best Management Practices and proposed to address the discharge of polluted runoff water will promote the production of mosquitoes and other vectors; and

WHEREAS, the types of devices listed as Best Management Practices have been determined in California and other states to produce unacceptable numbers of mosquitoes; and

WHEREAS, the devices listed will be placed in proximity to human dwellings, recreation facilities, schools and other places of human activity, and

WHEREAS, in the event that catchment devices are deployed, safe, unencumbered access to facilitate mosquito inspection, control, and maintenance activities will be needed; and

WHEREAS, the Association and its member entities support endeavors to lessen and/or prevent pollution and other threats to human health; now

THEREFORE BE IT RESOLVED, by the Board of Directors, that the Mosquito and Vector Control Association of California hereby expresses its concern that the aforementioned types of devices proposed as Best Management Practices to prevent the discharge of polluted runoff water will produce unacceptable numbers of mosquitoes and other vectors, will negatively impact public health, and will place a significant impact on resources and funds of local mosquito and vector control districts; and

BE IT FURTHER RESOLVED, by the Board of Directors, that the Association requests that technical representatives from the member agencies of the Association and from the California Department of Health Services be included in the formative process to determine the best methods to meet the goals of preventing both the contamination of waterways and the production of mosquitoes and other vectors of public health concern, and that the California Department of Transportation be encouraged to assume the responsibility for providing resources to assure that all catchment devices are maintained in a vector free state as mandated by California Health and Safety Code.

Resolution passed by the Board of Directors of the Mosquito and Vector Control Association of California on this 8^{th} day of May, 1998

Ayes: 10

Noes: O

Abstain: --

Absent:

Allan R. Ffuntner, President

Attest:

Donald A. Eliason, Executive Director

APPENDIX E

ROBERT BEIN, WILLIAM FROST & ASSOCIATES

PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS
LETTER OF TRANSMITTAL

TO:	Richard Horn	er		DATE:	May 14, 1998
	230 N. W. 55t	h Street		RBF JOB NO.:	34123
	Seattle, Wash	ington 98107		REFERENCE:	Caltrans, Dist. 7
ATTN:			,,,,,,,,,	DESCRIPTION	ı.
SENT TO	O YOU VIA:	X Mail Fax	Messenger Modem	Blueprinter Your Pick-Up	Overnight Delivery
NO. OF COPIES	NO. OF SHEETS	DESCRIP	IION		
1		Planting l	Recommendations fo	or Bio-Filter Strips, b	y Martha Blane 5/12/98
SENT FO	OR YOUR:	Approval Signature	X Review X Use	Comments	Per Your Request
REMAR	RKS:				
Cc:	•			ltrans B. Fin	ckman, NRDC nn, Brown & Caldwell a Monica Bay Keeper

ROBERT BEIN, WILLIAM FROST & ASSOCIATES

BY:

Bill Whittenberg, P.E.

Water Resources



Martha Blane & Associates Habitat Restoration Consulting

RECEIVED

ROBERT BEIN, WM FROST

May 12, 1998

Bill Whittenberg RBF & Associates 14725 Alton Parkway Irvine, CA 92618

Project: Caltrans Storm Water Management - Retrofit Pilot Study

Subject: Planting Recommendations for Bio-Filter Strips

Dear Bill:

In response to your request, enclosed herein is information on candidate plant species for planting within the bio-filter strips. Per our discussions and the background information you provided, the species chosen must perform certain functions and meet specific criteria, as follows:

- Filter suspended solids within runoff from paved areas
- Withstand one-year storm events
- Adapt to climate conditions within Caltrans Districts 7 and 11
- Tolerate periods of both high and low moisture
- Be low-growing
- Require little or no maintenance

Species that meet these criteria are shown on Table 1 (attached), along with information on plant life form, height, origin, beneficial/detrimental characteristics and comments. *Trifolium willdenovii* (tomcat clover), which was recommended previously by others, is also included on Table 1-for the purpose of comparison.

Leguminous plant species were researched because of their ability to add nitrogen to soils. Few legume species are available that meet the criteria listed above, particularly adaptability (i.e., drought tolerance) and low maintenance (most are annuals that may require replanting). To obtain some benefit from the use of nitrogen-fixing species, it is recommended that annual leguminous species be planted initially, but without expectation for natural reseeding.

May 12, 1998 RBF & Associates/M. Blane & Associates Planting Recommendations for Bio-Filter Strips Page 2

In order to increase the likelihood of adequate plant cover in the shortest possible time, while fulfilling the criteria above, it is recommended that a mixture of species be planted together. This approach is also beneficial in reducing the potential for damage from diseases and pests that could occur with a one-species, monoculture type planting.

A recommended mixture of species for planting within the bio-filter strips is shown on Table 2 (attached). The table shows the preferred planting method, material application rates for seeds and container plant densities for plants.

The availability of suitable plant species grown as sod was researched. None of the species shown in Table 1 or 2 are grown as sod since there is not an established market for them and most species are not sod forming. It may be possible to request that some species be contract grown (e.g., saltgrass and creeping wildrye) as sod. However, even if a grower agreed to grow sod, there is high risk for failure since it is not a usual practice.

The plant material that can be obtained in a sod-like form is saltgrass. It is grown in flats (±18" x 18") and may be purchased at Tree of Life Nursery in San Juan Capistrano (714.728.0685). However, as shown in Table 2 and described above, planting "plugs" from cut-up flats, along with other species, is recommended.

All seed and plant materials should be ordered well in advance of need to ensure availability. For example, Tree of Life Nursery currently has ± 15 flats of saltgrass available. They indicated that it takes about three months (during the warm season) to grow a flat of saltgrass. The needlegrass species are also currently available, but, availability changes on a daily basis.

May 12, 1998 RBF & Associates/M. Blane & Associates Planting Recommendations for Bio-Filter Strips Page 3

Per your request, the seed/plant mixture shown on Table 2 was compared to the seed mix presented in Design Directive Memorandum No. 6 (March 11, 1998) to determine which would be more appropriate for general erosion control. Of the two choices, I believe the seed mix shown in Memo. No. 6 would be the better choice. The reason for this is that there are two shrub species included, along with several grass species and a few legumes. The shrubs are the primary difference, and they will add greater diversity in stature, root system, and possibly the longevity of the plantings.

If you need information on other plant mixtures/assemblages, additional lists could be developed. Please contact me with any questions or comments and/or if you would like further assistance.

Sincerely,

Martha Blane

Attachments: Table 1

Table 2

References and Sources of Information

	PLANT SPECIES	TABLE 1 SUITABLE FOR	BIO-FILTER PLANTINGS	GS (Page 1 of 2)
Genus species	Common Name	Life Form	Height	Origin/Range
Bromus carinatus	California brome	grass, perennial, short- lived (± 2 years)	18" - 36"	Western US, British Columbia to Central America
Deschampsia caespitosa	Tufted hairgrass	grass, perennial, clumping	12" - 30"	North America
Distichlis spicata	Saltgrass	grass, perennial, rhizome/stolon forming	6" - 20"	North America to South America
Elymus glaucus	Blue wildrye	grass, perennial, clumping	18" - 36"	Alaska to Baja California
Hordeum brachyantherum	Meadow barley	grass, perennial, clumping	12" - 18"	North America to Baja California
Leymus triticoides "Rio"	Creeping _t wildrye	grass, perennial, creeping rhizomes	18" - 36"+	Western US and Baja Californía
Lupinus bicolor	Pygmy-leaf lupine	legume, annual	4" - 12"	California deserts, mountains and coastal areas
Nasella lepida	Foothill needlegrass	grass, perennial, clumping	12" - 24"	Northern California to Baja California
Nasella pulchra	Purple needlegrass	grass, perennial, clumping	12" - 24"	Northern California to Baja California
Trifolium willdenovii	Tomcat clover	legume, annual	4" - 16"	Western North America

		ABLE 1		
		(Continued)		(Page 2 of 2)
Genus species	Common Name	Benefits	Detriments	Comments
Bromus carinatus	California brome	Fast-growing, adapted to drought and poor soils.	Short-lived, may be too tall	Often used for soil stabilization and revenetation.
Deschampsia caespitosa	Tufted hairgrass	Grows in dense stands, adapted to moist soils, recovers well from disturbance.	May be too tall, too dense and require too much moisture.	Important range species, widely distributed, sometimes used for erosion control.
Distichlis spicata	Saltgrass	Stout, hardy, adapts to harsh soil conditions (wet or dry) and silt build-up, recovers well from disturbance.	Foliage may turn brown during coldest months.	Spreads by creeping stolons (similar to Bermuda grass in appearance, but not as vigorous), can form a tough mat-like cover.
Elymus glaucus	Blue wildrye	Fast-growing, fast- spreading, good for erosion control.	May be too tall.	Foliage is bluish-green.
Hordeum brachyantherum	Meadow barley	Fast-growing, begins spring growth early, tolerates moist soils.	May be short- lived.	Can provide cover while slower-growing species become established.
Leymus triticoides "Rio"	Creeping wildrye	Tolerates harsh conditions, heavy soils, forms a dense ground cover, long-lived.	May be too tall and too dense.	Stays green late into summer.
Lupinus bicolor	Pygmy-leaf lupine	Nitrogen-fixing, adapts to many soils, germinates early.	Annual, may not reseed if other vegetation is present.	Frequently included in erosion control and revegetation seed mixes.
Nasella lepida	Foothill needlegrass	Adapted to drought and poor/disturbed soils, longlived, low fuel.	Best in well- drained soils.	Common component of California grasslands; often used for revegetation.
Nasella pulchra	Purple needlegrass	Adapted to drought and poor/disturbed soils, longlived, low fuel.	Best in clayey soils.	Major component of California grasslands, often used for revegetation.
Trifolium willdenovii	Tomcat clover	Nitrogen-fixing, adapts to heavy soils, germinates early.	Annual, may not reseed.	Seed recently became available for erosion control and revegetation plantings.

RE	RECOMMENDED SPEC	TABLE 2 SPECIES MIXTURE FOR BIO-FILTER PLANTINGS ⁽¹⁾	PLANTINGS(1)
Genus species	Common Name	Seed Application Rate Per Acre %Purity/%Germination	Container Plant Spacing and Container Size/Type
Bromus carinatus	California brome	6.0 pounds per acre 95/80	
Distichlis spicata	Saltgrass		12" on-center spacing of "plugs" from cut-up flats
Deschampsia caespitosa	Tufted hairgrass	1.0 pound per acre 80/60	
Hordeum brachyantherum	Meadow barley	5.0 pounds per acre 90/80	
Lupinus bicolor	Pygmy ^յ leaf lupine	3.0 pounds per acre 98/80	
Nasella lepida	Foothill needlegrass	•	12" on-center spacing of groove tubes (2" deep x 3/4" wide)
Nasella pulchra	Purple needlegrass	•	12" on-center spacing of groove tubes (2" deep x 3/4" wide)
Trifolium willdenovii	Tomcat clover	1.5 pounds per acre 95/75	•

1. Seed and container plant recommendations based on which material will provide the most reliable and fastest cover. Some container species are also available as seed.

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Watershed Management Institute, Inc. 1997.

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FAX COVER SHEET

Date:

June 19, 1998

JN 34123

To:

Dr. Richard Horner

Company: NRDC FAX: (206) 781-9584

From:

Mike Chesney

Department: Transportation Engineering

Phone/Ext.: (714) 855-5792

.

FAX: (714) 837-8007

Subject:

Erosion Control Seed Mix

Please give copies of this transmission to:

Total pages (including Cover Sheet):

15

Message:

Pursuant to your comments regarding the erosion control seed mixes for the Caltrans District 11 projects, we are faxing to you the section from the technical specifications indicating the seed mixes to be used for the various BMP facilities/designs. The following illustrates which technical specification (marked PS&E Technical Special Provisions and Procurement Technical Special Provisions) correlates to a particular BMP facility/design:

- 1. The *PS&E Technical Special Provisions* designate the erosion control seed mix for the Extended Detention Basins, Infiltration Basins, and Non-Biofiltered Drainage Swales (i.e. perimeter swales).
- 2. The *Procurement Technical Special Provisions* designate the erosion control seed mixes for the Biofilter Swales and the Biofilter Strips.

These erosion control seed mixes were verified or modified by Martha Blane per a letter report to RBF dated May 12, 1998. Any modifications were incorporated into the respective Technical Special Provisions.

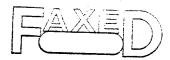
Additionally, I am forwarding the Engineer's Estimate for the PS&E (Extended Detention Basins and Infiltration Basin) designs. Please note Item No. 27 "Concrete (Basin Lining)

IF THERE ARE ANY QUESTIONS OR IF YOU DO NOT RECEIVE ALL DOCUMENTS, PLEASE CALL US.

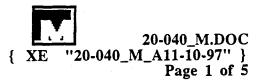
depicts the concrete volume and the associated estimated cost for the concrete lining of the SR-78/I-15 Extended Detention Basin. Currently, this is the only basin lined with concrete in the San Diego region. Two basins are on the contingency schedule, and we will determine the concrete lining option at a later time.

Please call me should you have any comments, questions, or require any additional information. Thank you for you assistance on such short notice.

pc: Chris May, NRDC - Fax No. (360) 697-2149 — Maile (...
Yulya Davidova, Caltrans District 11 - Fax No. (619) 688-6655
Scott Taylor, RBF
Bill Whittenberg, RBF



P.S. WE ARE ALSO WOKING AT THE OPTION OF ESTABLISHING SOD W/ THESE SEED WIKES FOR PAPID GROWTH AND PLACEMENT.



DISTRICT TO EDIT

(Para 2 revised. One-column revisions)

(Use when straw incorporation IS NOT required) (Use SSP 20-030_M when straw incorporated is required)

(It is preferable to use separate pay items for each material. For small areas, may be paid for erosion control work by the area involved, e.g., acres or square vards)

(When more than one seed mix is required, revise the seed mix to "Seed (Type 1)" and "Seed (Type 2)" and add the appropriate locations, tables, materials and application rates.)

(Insert in Section 10-1. DO NOT insert in Section 10-2.)

USE CONTRACT ITEM CODE: 203045 PURE LIVE SEED (EROSION CONTROL)

10-1.__ EROSION CONTROL (TYPE D)

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

(Para 2: Consult with District Landscape Architect and fill in appropriate dates. Erosion Control application period starting date and completed work date should be same)

Erosion control (Type D) work shall consist of applying erosion control materials to embankment and excavation slopes 1:4 (vertical:horizontal) or steeper, and other areas designated by the Engineer. Erosion control (Type D) shall be applied during the period starting ______ and ending ______; or, if the slope on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" elsewhere in these special provisions the erosion control shall be applied immediately; or, if the slope on which the erosion control is to be placed is finished outside both specified periods and the contract work will be completed before ______, the erosion control shall be applied as a last item of work.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials and other debris shall be removed from areas to receive erosion control.

MATERIALS.—Materials shall conform to Section 20-2, "Materials," of the Standard Specifications and the following:

4a*

4b

(Use Para 4a OR Paras 4b thru 4g) (Para 4a: Use when another erosion control SSP specifies the same seed specifications)

SEED.—Seed for erosion control (Type D) shall conform to the provisions specified for seed under "Erosion Control (_______)" elsewhere in these special provisions.

(Paras 4b thru 4g: Use when seed is NOT specified elsewhere in the special provisions)

SEED.—Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall have been tested for purity and germination not more than one year prior to application of seed.

Results from testing seed for purity and germination shall be furnished to the Engineer prior to applying seed.

(Paras 4f thru 4f(6): Delete when legume seed is not required)

LEGUME SEED.—Legume seed shall be pellet-inoculated or industrial-inoculated.

Pellet-inoculated seed shall be inoculated in accordance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.

Inoculated seed shall have a calcium carbonate coating.

Pellet-inoculated seed shall be sown within 90 days after inoculation.

Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.

4f(5) Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.
4f(6)

Legume seed shall consist of the following:

4f(2)

4f(3)

4f(6a)*

(Para 4f(6a): Insert seed names, germination and application rates in the table. Increase or decrease rows in table as required. Do not edit column headings)

LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms pure live seed per hectare (Slope measurement)
Trifolium Willdenovii (Tomcat Clover)		3.4
Lotus Scoparius (Deerweed)		3.4
Lupinus Bicolor (Miniature Lupine)		<u>4.5</u>

4g*

NON-LEGUME SEED.—Non-legume seed shall consist of the following:

4g(1)*

(Para 4g(1): Insert seed names, germination and application rates in the table. Increase or decrease rows in table as required. Do not edit column headings)

NON-LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms pure live seed per hectare (Slope measurement)
Vulpia Microstachys (Zorro Grass)	·	<u>5.6</u>
Hordeum Californicum (California Barley)		<u>11.25</u>
Hordeum Vulgare (Barley)		<u>10.1</u>
Eschschoizia Californica (California Poppy)		<u>2.25</u>
Nassella Pulchra (Purple Needlegrass)		4.5
Bromus Carinatus "Cucamonga" (Brome Grass)		2.25
Encelia Californica (California Encelia)		<u>2.25</u>

Seed shall be delivered to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag will not be accepted. A sample of approximately 30 g of seed will be taken from each seed container by the Engineer. (Use Paras 4j OR 4k. Delete both Paras if 16-20-0 of the Standards Specifications is to be used) (Para 4j: Edit for commercial fertilizer required) COMMERCIAL FERTILIZER.—Commercial fertilizer shall conform to provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of __ percent nitrogen, __ percent phosphoric acid and __ percent water soluble potash. 4k* (Para 4k: Use when another erosion control SSP specifies commercial fertilizer to be used) COMMERCIAL FERTILIZER.—Commercial fertilizer for erosion control (Type D) shall conform to the provisions specified for commercial fertilizer under "Erosion Control _____)" elsewhere in these special provisions. 41* (Use Para 41 OR 4m. Delete both Paras if the types of straw in the Standard Specifications are acceptable)

STRAW. Straw shall be derived from rice.

STRAW. Straw shall be derived from wheat and barley. Wheat and barley straw shall not be derived from dry farmed cereal crops.

STABILIZING EMULSION .—Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

The requirement of an effective life of at least one year for stabilizing emulsion shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil binder.

(Para 5: Edit for number of applications)

APPLICATION.—Erosion control materials shall be applied in ___ separate applications in the following sequence:

5 *

10; - JELLI. SPECIAL PILLOVISIONS

(Para 5a: Use when legume seed is applied by the dry method. Application rate must match total shown in Para 4f(6). Delete Para when legume seed MAY be applied with hydro-seeding equipment)

Legume seed shall be applied by a dry method at the rate of __ kg/ha (slope measurement). Legume seed shall not be applied with hydro seeding equipment.

5b

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

5b(1)*

(Para 5b(1): Delete "Legume Seed" row from table when Para 5a is used. If straw is to be used, delete commercial fertilizer from this application)

Material Kilograms per hectare

(Slope measurement)

Fiber-

Non-Legume Seed

Legume Seed

Commercial fertilizer

5c*

(Para 5c: Indicate application rate for straw-normally 4.0 tonnes per hectare for wheat or barley and 2 tonnes for rice)

Straw shall be applied at the rate of ____ tonnes per hectare based on slope measurements. Incorporation of straw will not be required.

5d

The following mixture in the proportions indicated shall be applied with hydro seeding equipment:

5d(1)*

Material Kilograms per hectare

(Slope measurement)

Fiber ----

Commercial fertilizer

Stabilizing emulsion (solids)

5 e

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

6

Once straw work is started in an area, the remaining applications shall be completed in that area on the same working day.

(Para 7: Delete when erosion control is paid for by the square meter or hectare)

The proportions of erosion control-materials may be changed by the Engineer to meet field conditions.

5/6

8

(Paras 8 and 9: Delete when erosion control is paid for by the square meter or hectare)

MEASUREMENT AND PAYMENT.—The quantity of pure live seed (erosion control) to be paid for by the kilogram will be determined by multiplying the percentage of purity by the percentage of germination by the marked mass on the sack.

Pure live seed (erosion control) will be paid for by the kilogram in the same manner specified for seed in Section 20 3.07 of the Standard Specifications.

ENGINEER'S ESTIMATE

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price (In Figures)	Item Total (In Figures)
1	074019	PREPARE STORM WATER POLLUTION PREVENTION PROGRAM	LS	LUMP SUM	LUMP SUM	40,000.00
2 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM	LUMP SUM	7,000.00
3	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	10,000.00
4	120199A	TRAFFIC PLASTIC DRUMS	EA	34	50.00	1,700.00
5	129000	TEMPORARY RAILING (TYPE K)	M	700	30.00	21,000.00
6	129100	TEMPORARY CRASH CUSHION MODULE	EA	4	250.00	1,000.00
7	150209	ABANDON DRAINAGE FACILITY	LS	LUMP SUM	LUMP SUM	8,500.00
8	150802	REMOVE DRAINAGE FACILITIES	LS	LUMP SUM	LUMP SUM	9,500.00
9	151540	RECONSTRUCT CHAIN LINK FENCE	М	55	50.00	2,750.00
10	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	20,000.00
11	190101	ROADWAY EXCAVATION	M ³	17,700	12.00	212,400.00
12	193118	CONCRETE BACKFILL	M³	55	200.00	11,000.00
13 (S)	203016	EROSION CONTROL (TYPE D)	НА	10	5,000.00	50,000.00
14	260201	CLASS 2 AGGREGATE BASE	M³	340	25.00	8,500.00
15	390155	ASPHALT CONCRETE (TYPE A)	TONN	220	35.00	7,700.00
16 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M³	31	800.00	24,800.00
17	650069	450 MM REINFORCED CONCRETE PIPE	M	170	175.00	29,750.00
18	650075	600 MM REINFORCED CONCRETE PIPE	M	440	150.00	66,000.00
19	650075A	750 MM REINFORCED CONCRETE PIPE	M	85	200.00	17,000.00

ENGINEER'S ESTIMATE

20	664015A	450 MM CORRUGATED STEEL PIPE (3.51 MM THICK)	М	2	300.00	600.00
21	664035	900 MM CORRUGATED STEEL PIPE (3.51 MM THICK)	М	20	500.00	10,000.00
22	664045	1200 MM CORRUGATED STEEL PIPE (3.51 MM THICK)	М	10	600.00	6,000.00
23	705525A	CANAL GATE	LS	LUMP SUM	LUMP SUM	75,000.00
24	707133A	900 MM PRECAST CONCRETE PIPE RISER	М	30	1,800.00	54,000.00
25	721007	ROCK SLOPE PROTECTION (1/4 TON, METHOD B)	- M ³	140	75.00	10,500.00
26	721009	ROCK SLOPE PROTECTION (FACING, METHOD B)	M³	80	110.00	8,800.00
27	721430A	CONCRETE (BASIN LINING)	M³	950	350.00	332,500.00
28	729010	ROCK SLOPE PROTECTION FABRIC	M²	25	4.00	100.00
29	731516	MINOR CONCRETE (DRIVEWAY)	M ³	4	350.00	1,400.00
30 (S-F)	750001	MISCELLANEOUS IRON AND STEEL	KG	9100	12.00	109,200.00
31	820132	OBJECT MARKER (TYPE L)	EA	3	40.00	120.00
32	999990	MOBILIZATION	LS	LUMP SUM	LUMP SUM	115,682.00
				SUBTOTAL CO	NTRACT ITEMS:	1,272,502.00
				SUPPLEN	IENTAL WORK:	
				5% CC	ONTINGENCIES:	63,625.00
					GRAND TOTAL:	1,336,127.00

PICM:

I <u>REMOVED</u> THE CONCILETE LINING,

COSTS AND ESTIMATED A SEPARATE

COST FOR EACH OF THE 3 BASING

IN DIST. II. HOPE THIS HELPS. ->

MILLE.

- TOTAL COST CONCRETE LINING = \$ 1,336,000 - \$ 332,500 = \$ 1,004,000
- ESTIMATED SEPARATE BASIN (65TS: ① I-5/SR-56 EXTENDED DETENTION BUSIN = 30% (#1,004,000) = \$\$301,200
- = 30% (\$1,004,000) = \$301,200 ② SR78/I-15 EXTENDED DETENTION BUSIN = 40% (\$1,004,000) = \$401,600
- (3) I-5/LA COSTA INFILTRATION BASINI = 30% (\$1,004,000) = \$301,200

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION MARGINAL ESTIMATE - MISCELLANEOUS STRUCTURE OTHER THAN BRIDGE

		PROGRAM							· .		
11	SD	ROUTE 5,15,76,78	POST MILE		TYPE			LENGTH		WIDTH	
	_L		_1			T					
CODE	CONTRACT				UNIT	QUANTITY	CHECK	USE	PRICE	AMOUNT	
074019	1	FORM WATER POL N PROGRAM	LUTION		LS					40,000.0	
120090 (S)		TION AREA SIGNS			LS					7,000.0	
120100		NTROL SYSTEM			LS					10,000.0	
120199A		ASTIC DRUMS			EA	34			50.00	1,700.0	
129000		Y RAILING (TYPE)			M	700			30.00	21,000.0	
129100		CRASH CUSHIO			EA	4			250.00	1,000.0	
150209	+	PRAINAGE FACILIT			LS					8,500.0	
150802		AINAGE FACILITIE		· · · · · · · · · · · · · · · · · · ·	LS					9,500.0	
151540		ICT CHAIN LINK F	ENCE		M	55			50.00	2,750.0	
160101		ND GRUBBING			LS				<u> </u>	20,000.0	
190101	 	EXCAVATION			M ³	17,700			12.00	212,400.0	
193118	CONCRETE		***		M ³	55			200.00	11,000.0	
203016 (S)		NTROL (TYPE D)			HA	10		<u> </u>	5,000.00	50,000.0	
260201	+	GREGATE BASE			M ³	340	,		25.00	8,500.0	
390155	 	ONCRETE (TYPE A			TONN				35.00	7,700.0	
510502 (F)		CRETE (MINOR ST			M ³	31			800.00	24,800.0	
650069		NFORCED CONCR			М	170			175.00	29,750.0	
650075		NFORCED CONCR			М	440			150.00	66,000.0	
650075A		NFORCED CONCR			M	85			200.00	17,000.0	
664015A	(3.51 MM TI	RRUGATED STEEL HICK)	PIPE		М	2			300.00	600.0	
664035	i	RRUGATED STEEL	PIPE		М	20	<u></u>		500.00	10,000.0	
664045	1200 MM C	ORRUGATED STEE	L PIPE		M	10			600.00	6,000.0	
	(3.51 MM T	IICK)									
705525A	CANAL GAT	Ē			LS	-				75,000.0	
707133A	900 MM PRE	CAST CONCRETE	PIPE RISER		М	30			1,800.00	54,000.0	
721007		PROTECTION			M ³	140			75.00	10,500.0	
	(1/4 TON, METHOD B) ROCK SLOPE PROTECTION (FACING, METHOD B) CONCRETE (BASIN LINING) ROCK SLOPE PROTECTION FABRIC MINOR CONCRETE (DRIVEWAY)										
721009				M ³	80			110.00	8,800.0		
721430A				M ³	950			350.00	332,500.00		
729010				M ²	25			4.00	100.00		
731516				M ³	4			350.00	1,400.00		
		OUS IRON AND S	TEEL		KG	9,100			12.00	109,200.00	
320132	20132 OBJECT MARKER (TYPE L)			EA	3			40.00	120.00		
										-	
						SUBTOTAL			\$	1,156,820.00	
RECEIVED IN	ESTIMATE SE	CTION BY	DATE	:		MOBILIZATION 10%					
									1,272,502.00		
						SUBTOTAL CONTRACT ITEMS				1,272,302.00	
DUANTITIES	BY		DATE			SUPPLEMENTAL WORK					
Ann Walker 4/6/98				CONTINGENCIES 5%				63,625.00			
HECKED BY			DATE	<u>:</u>		TOTAL			\$	1,336,127.00	
Mike Chesn	ev		4	/6/98		FOR BUDGET	PURPOSES U	ee .	\$		
EVISED BY			DATE			TON BODGET	1 0/11 0323 0	JE .	17		

MARGINAL ES	STIMATE BY		DATE								
al Sheikh			4	/6/98					··· · ·········		
			1.								

Filter Media shall not be installed until the project site is clean and stabilized. The project site includes any surface which contributes storm drainage to the filter. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manholes and pipes shall be free of dirt and sediments.

- 5.3.2 WEIRS: shall be level and sealed at all joints with silicone sealant. Sealant shall be worked into joint from both sides.
- 5.3.3 CLEANUP: Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the Engineer. All PVC and fiberglass filter components shall be free of any foreign materials including concrete and excess sealant.
- 5.3.4 RESTORATION: Existing facilities and pavement not to be removed as shown on the plans or specified elsewhere shall be restored to original condition.
- 5.3.5 PVC PIPING: Shall be joined in accordance with ASTM D2564.
- 5.3.6 CAST-IN-PLACE CONCRETE FINISHING
 - (1) Unexposed Wall Finish Patch all rock pockets, form tie holes, and other irregularities with mortar. No further finishing will be required.
 - Ordinary Wall Finish Immediately after removal of forms, patch or point up all defects and cure patches to a point 150 mm below exposed grade. After pointings have set sufficiently, grind or fill all form marks and pointings to give a smooth surface even with the flat wall surface.
 - (3) Horizontal Surfaces

Finish upper horizontal surfaces such as tops of walls by placing an excess of concrete in the forms and removing or striking off such excess with a wooden float and forcing coarse aggregate below mortar surface. The use of mortar topping for surfaces falling under this classification will not be permitted.

After concrete has been struck off, work surface thoroughly and float with a wooden, canvas or cork float, by skilled and experienced concrete finishers. Before this last finish has set, broom surface lightly, parallel to the long dimension, with a fine brush to remove surface cement film leaving a fine-grained, smooth, but sandy texture.

The contract price paid per unit for the sand filter Type II BMP shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work, clean up, and restoration involved in constructing the sand filter units, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

BIOFILTER SWALE

6. BIOFILTER SWALE UNIT

Biofilter Swale unit shall conform to the folling provisions:

6.1 DITCH EXCAVATION

- 6.1.1 Ditch Excavation shall conform to the provisions in Section 19 "Earthwork" of the Standard Specifications and these special provisions.
 - (1) Ditch Excavation shall consist of excavating ditches within or outside the right of way, including channels for changing the course of streams, all as shown on the plans or specified or directed by the Engineer.
 - (2) The excavation required to construct ditches or channels shall be classified as ditch excavation.

- (3) Materials resulting from excavating ditches or channels shall be used to construct roadway embankment, ditches, or for other purposes, or disposed of, all directed by the Engineer.
- (4) Care shall be exercised to prevent excavating below the grade for the bottom of the ditch or water channel, and areas excavated below grade shall be filled with suitable material and thoroughly compacted by the Contractor at the Contractor's expense.

6.2 SEEDING AND PLANTING

- 6.2.1 Seeding and Fertilizing shall conform to the provisions in Section 20, "Erosion Contol and Highway Planting" of the Standard Specifications and these special provisions.
- 6.2.2 Planting Materials shall conform to the provisions in Section 20-4.05, "Planting" of the Standard Specifications and these special provisions.

6.3 Materials

- 6.3.1 Seed shall conform to the provisions in Section 20-2.10, "Seed" of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.
 - (1) Seed not required to be labeled under the California Food and Agricultural
 Code shall be tested for purity and germination by a seed laboratory
 certified by the Association of Official Seed Analyst, or a seed
 technologist certified by the Society of Commercial Seed Technologists.
 - (2) Seed shall have been tested for purity and germination not more than one year period to application of seed.
 - (3) Seed shall have been tested for purity and germination not more than one year period to application of seed.
 - (4) Results from testing seed purity and germination shall be furnished to the Engineer prior to applying seed.
- 6.3.2 Legume Seed.-Legume seed shall be pellet inoculated or industrial inoculated.
 - (1) Pellet-inoculated seed shall be inoculated in accordance with the provisions in Section 20-2.10, "Seed", of the Standard Specifications Inoculated seed shall have a calcium carbonate coating. Pellet Inoculated seed shall be sown within 90 days after inoculation.
 - (2) Industrial inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.
- 6.3.3 The following mixture shall be used for the biofilter swale:

Botonical Name	%Purity/ %Germination	Seed Application Rate/Hectare	Container Plant Spacing and Container Size/Type
Bromus carinatus	95/80	. 6.7 kg/ha	
Distichkis spicata		_	300mm C-C of plugs from cut up flats
Deschampsia	80/60	3.4 kg/ha	•
caespitisa			
Horedeum	90/80	5.6 kg/ha	
brachyantherum			
Lupinus Bicolor	98/80	3.4 kg∕ha	
Nasella lepida			300mm C-C of groove tubes (50mm deep x 19mm wide)

Nasella pulchra

300mm C-C of groove tubes (50mm deep x 19mm wide)

Trifolium Willdenovii 95/75

1.1 kg/ha

6.3.4 The required seeding and planting for the Biofilter Swale shall be classified as Biofilter Swale BMP.

The contract price paid per square meter for biofilter swale BMP shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the biofilter swale, complete in place, excluding ditch excavation as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

BIOFILTER STRIP

7. BIOFILTER STRIP UNIT

Biofilter Strip unit shall conform to the folling provisions:

7.1 EXCAVATION AND GRADING

- 7.1.1 Biofilter Strip Excavation and Grading shall conform to the provisions in Section 19 "Earthwork" of the Standard Specifications and these special provisions.
 - (1) Materials resulting from excavating biofilter strips shall be disposed of as directed by the Engineer.
 - (2) Care shall be exercised to prevent excavating below the grade for the bottom of the biofilter strip and areas excavated below grade shall be filled with suitable material and thoroughly compacted by the Contractor at the Contractor's expense.

7.2 SEEDING AND FERTILIZING

- 7.2.1 Seeding and Fertilizing Seeding and Fertilizing shall conform to the provisions in Section 20, "Erosion Contol and Highway Planting" of the Standard Specifications and these special provisions.
- 7.2.2 Planting Materials shall conform to the provisions in Section 20-4.05, "Planting" of the Standard Specifications and these special provisions.

7.3 Materials

- 7.3.1 Seed shall conform to the provisions in Section 20-2.10, "Seed" of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.
 - (1) Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analyst, or a seed technologist certified by the Society of Commercial Seed Technologists.
 - (2) Seed shall have been tested for purity and germination not more than one year period to application of seed.
 - (3) Results from testing seed purity and germination shall be furnished to the Engineer prior to applying seed.
- 7.3.2 Legume Seed.-Legume seed shall be pellet inoculated or industrial inoculated.

- (1) Pellet-inoculated seed shall be inoculated in accordance with the provisions in Section 20-2.10, "Seed", of the Standard Specifications Inoculated seed shall have a calcium carbonate coating. Pellet Inoculated seed shall be sown within 90 days after inoculation.
- (2) Industrial inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.

7.3.3 The following mixture shall be used for the biofilter strip:

Botonical Name	%Purity/ %Germination	Seed Application Rate/Hectare	Container Plant Spacing and Container Size/Type
Bromus carinatus Distichkis spicata	95/80	6.7 kg/ha	300mm C-C of plugs from cut up flats
Deschampsia caespitisa	80/60	3.4 kg/ha	•
Horedeum brachyantherum	90/80	5.6 kg/ha	
Lupinus Bicolor Nasella lepida	98/80	3.4 kg/ha	300mm C-C of groove tubes (50mm deep x 19mm wide)
Nasella pulchra			300mm C-C of groove tubes (50mm deep x 19mm wide)
Trifolium Willdenovii	95/75	1.1 kg/ha	

7.3.4 The required seeding and planting for the Biofilter Strip shall be classified as Biofilter Strip BMP.

The contract price paid per square meter for biofilter strip BMP shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructin the biofilter strip, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

INFILTRATION TRENCH

8. INFILTRATION TRENCH UNIT

Infiltration Trench unit shall conform to the folling provisions:

8.1 INFILTRATION TRENCH EXCAVATION

- 8.1.1 Infiltration Trench Excavation shall conform to the provisions in Section 19 "Earthwork" of the Standard Specifications and these special provisions.
 - (1) Materials resulting from excavating biofilter strips shall be disposed of as directed by the Engineer.
 - (2) Care shall be exercised to prevent excavating below the grade for the bottom of the biofilter strip and areas excavated below grade shall be filled with suitable material and thoroughly compacted by the Contractor at the Contractor's expense.

APPENDIX F

June 1998

Sunday	. Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Gunday	1	2	3	4	5	6
	PSE D7/D11 Design Report to Plaintiff OMM D7/D11 Vol 1 Comments Due from Plaintiff Procurement D11 RBF Construction Bidder Pre-qualification		Teleconference-LMPS	4	OMM D7/D11 Response to Comments Due to Plaintiff	O
7	Procurment D7 MW Design Reports to RBF for Review Procurement D7 BC Design Reports to RBF for Review	9	10	PSE D7 Decision Point PSE D11 Decision Point	12	13
14	15	16	17	18	D11 Procurement - First Decision Point D7 BCC Procurement Supplemental Report to NRDC	20
21	D7 MW Procurements Permits Issued PSE D11 Advertisement Procurement D11 RBF Construction Advertise for Bids D11 Procurement Decision Point	23	24	25	26	27
28	29	D7 MW Procurements Supplemental LMPS Specifications for BMPs EC Final Field and Lab Design Procurement D7 BC Design				

June

1	PSE D7/D11 Design Report to Plaintiff
	OMM D7/D11 Vol 1 Comments Due from Plaintiff
	Procurement D11 RBF Construction Bidder Pre-qualification
3	Teleconference-LMPS
5	OMM D7/D11 Response to Comments Due to Plaintiff
8	Procurment D7 MW Design Reports to RBF for Review
	Procurement D7 BC Design Reports to RBF for Review
11	PSE D7 Decision Point
	PSE D11 Decision Point
19	D11 Procurement - First Decision Point
	D7 BCC Procurement Supplemental Report to NRDC
22	D7 MW Procurements Permits Issued
	PSE D11 Advertisement
	Procurement D11 RBF Construction Advertise for Bids
	D11 Procurement Decision Point
30	D7 MW Procurements Supplemental Report to NRDC
	LMPS Specifications for BMPs
	EC Final Field and Lab Design
	Procurement D7 BC Design Reports to Plaintiff for Review
	Procurement D11 RBF Construction Pre-bid Conference

July 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
			10:00 AM 12:00 PM OMM Plan Mid-Course		EC Draft Field and Lab Design to NRDC	
			Procurement D11 RBF Construction Bid Opening	,		
			EC Field Lab and Design-Internal Draft			
5	6	7	8	9	10	11
			9:00 AM 12:00 PM CONFERENCE CALL-D7 EC Pilot Study (Woodward-Clyde Phone Number) with Carol Forrest, Jean Hill, Martha Blane, Erika Kegel, Chris May and Richard Homer.			
12	13	14	15	16	17	18
		9:00 AM 12:00 PM Pilot Studies and Vector Control Summer Quarterly Meeting at Caltrans D7 BCC Procurement -		PSE D11RBF Bid Opening	OMM D7/11 Vol 1 Due to Caltrans	
		First Decision Point D7 MW Procurement-First Decision Point		PSE D11 Construction Bid Openings	EC Draft Field and Lab Design Comments from NRDC Due to Caltrans	
19	20	21	22	23	24	25
				OMM D11 Vol 2 Draft Due to Caltrans		
						·
26	27	28	29	30	31	
	Procurement D11 RBF Construction Review Bid		OMM D7/11 Vol 1 Comments Due to RBF	OMM D11 Vol 2 Comments Due to RBF	Final EC Field and Lab Design	

July

1	Procurement D11 RBF Construction Bid Opening
	EC Field Lab and Design-Internal Draft
	OMM Plan Mid-Course
3	EC Draft Field and Lab Design to NRDC
8	CONFERENCE CALL-D7 EC Pilot Study (Woodward-Clyde Phone Number) with Carol Forrest, Jean Hill, Martha Blane, Erika Kegel, Chris May and Richard Horner.
14	D7 BCC Procurement - First Decision Point
	D7 MW Procurement-First Decision Point
	Pilot Studies and Vector Control Summer Quarterly Meeting at Caltrans D7 Room 400 with Steve Borroum, Yulya Davidova, Rich Horner, Chris May, Rich Graff, Cid Tesoro, Peter Van Riper, Doug Failing, Bob Finn, Gary Friedman, Bill Walton, Dean Messer, Scott Taylor, Bill Wittenberg, Mark Williams, Terry Tamminen, Ken Moser, Ed Othmer.
16	PSE D11RBF Bid Opening
	PSE D11 Construction Bid Openings
17	OMM D7/11 Vol 1 Due to Caltrans
	EC Draft Field and Lab Design Comments from NRDC Due to Caltrans
23	OMM D11 Vol 2 Draft Due to Caltrans
27	Procurement D11 RBF Construction Review Bid
29	OMM D7/11 Vol 1 Comments Due to RBF
30	OMM D11 Vol 2 Comments Due to RBF
31	Final EC Field and Lab Design

August 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	5 6 12 13 19 20	Jul 1998 T W T F S 1 2 3 4 7 8 9 10 11 14 15 16 17 18 21 22 23 24 25 28 29 30 31	Sep 1998 S M T W T F 1 2 3 4 6 7 8 9 10 11 13 14 15 16 17 18 20 21 22 23 24 25 27 28 29 30	5 12 19		1
2	3 PSE D7 BCC and MW Advertisement	4	5	OMM D7 Vol 2 Draft Due to Caltrans	7	8
9	Procurement D11 RBF Notice to Proceed	11	12 OMM D7/11 Vol 1 Draft to Plaintiff Procurement D11 RBF Begin Construction	PSE D11 RBF Construction Contract Award	D7 BCC Procurements Begin Construction	15
16	17	18 PSE D11 Caltrans Begin Construction OMM D7 Vol 2 Draft to Plaintiff	19	20 OMM D7 Vol 2 Caltrans Comments Due to Consultants (Meeting)	21	22
23	24	25	26	27	28	29
30	31					

August

3	PSE D7 BCC and MW Advertisement
6	OMM D7 Vol 2 Draft Due to Caltrans
10	Procurement D11 RBF Notice to Proceed
12	OMM D7/11 Vol 1 Draft to Plaintiff
	Procurement D11 RBF Begin Construction
13	PSE D11 RBF Construction Contract Award
14	D7 BCC Procurements Begin Construction
18	PSE D11 Caltrans Begin Construction
	OMM D7 Vol 2 Draft to Plaintiff
20	OMM D7 Vol 2 Caltrans Comments Due to Consultants (Meeting)

September 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
		9:00 AM 12:00 PM Retrofit Pilot Status Meeting 1:00 PM 4:00 PM LA Retrofit Pilots Status Meeting D7/D11 Status Construction OMM D7 Vol 2 100% Draft Due	OMM D7/11 Vol 1 Comments Due to Caltrans from Plaintiff			
6	7	8	OMM D11 Vol 2 Plaintiff's Comments Due to Caltrans OMM D7 Vol 2 First Final Draft to Plaintiff for Review	10	11	12
13	14 OMM D7/11 Vol 1 Response to Comments Due to Plaintiff	15	16	17	18 OMM D11 Vol Response to Plaintiff's Comments Due	19
20	21 PSE D7 Caltrans Begin Construction	22	23	24	25	26
27	28 OMM D7/11 Vol 1 Final Draft to Plaintiff	29	30 OMM D7 Vol 2 Plaintiff's Comments Due to Caltrans			

September

1	Retrofit Pilot Status Meeting
	LA Retrofit Pilots Status Meeting
	D7/D11 Status Construction
	OMM D7 Vol 2 100% Draft Due to Caltrans
2	OMM D7/11 Vol 1 Comments Due to Caltrans from Plaintiff
9	OMM D11 Vol 2 Plaintiff's Comments Due to Caltrans
	OMM D7 Vol 2 First Final Draft to Plaintiff for Review
14	OMM D7/11 Vol 1 Response to Comments Due to Plaintiff
18	OMM D11 Vol Response to Plaintiff's Comments Due
21	PSE D7 Caltrans Begin Construction
28	OMM D7/11 Vol 1 Final Draft to Plaintiff
20	OMM D7 Vol 2 Plaintiff's Comments Due to Caltrans

October 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
,		Nov 199		1	2	3
	Sep 1998 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W	T F S 5 6 7 12 13 14 19 20 21	D7 and D11 Status Construction Reports to Plaintiff	OMM D11 Vol 2 Second Final Draft to Plaintiff	
4	5 OMM D7/11 Vol 1 Final Plaintiff's Comments to Caltrans	6	7	8	OMM D11 Vol 2 Second Final Draft Plaintiff's Comments Due to Caltrans OMM D7 Vol 2 First Final Draft Response to Plaintiff's Comments Due	10
11	12 OMM D 7/11 Vol 1 Final Document	13	14	15	16	17
18	19	20 OMM D11 Vol 2 Final Document	21	22	23 OMM D7 Vol 2 Second Final Draft Due to Plaintiff	24
25	26 OMM D 7/11 Vol 2 Implement OMM Plan	27	28	29	30 OMM D7 Vol 2 Second Final Draft Plaintiff's Comments Due to Caltrans	31

October

1	D7 and D11 Status Construction Reports to Plaintiff
2	OMM D11 Vol 2 Second Final Draft to Plaintiff
5	OMM D7/11 Vol 1 Final Plaintiff's Comments to Caltrans
9	OMM D11 Vol 2 Second Final Draft Plaintiff's Comments Due to Caltrans
	OMM D7 Vol 2 First Final Draft Response to Plaintiff's Comments Due to Plaintiff
12	OMM D 7/11 Vol 1 Final Document
20	OMM D11 Vol 2 Final Document
23	OMM D7 Vol 2 Second Final Draft Due to Plaintiff
26	OMM D 7/11 Vol 2 Implement OMM Plan
30	OMM D7 Vol 2 Second Final Draft Plaintiff's Comments Due to Caltrans

November 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
·						
-						
8	9	10	11	12	13	14
	D7 Site Visits	D7 Site Visits	D11 Site Visits			17
			OMM D7 Vol 2 Final			
			Document Document			
·			PSE D7 BC Construction Status			
			Report Due to Plaintiff PSE D7 MW Construction Status		:	
15	16	17	Construction Status	10	20	21
15	16	17	18 D7 PSE and	19	20	21
			Procurement Second Decision Point			
			D11 PSE and Procurement Second			
			Decision Point			
22	23	24	25	26	27	28
-						
						·
						·
29	30	and the				
	OMM D7 Vol 2 Implement OMM Plan		·			
	PSE D11 RBF Construction Ends					
	PSE D7 BC Construction	į				
	Ends					
	PSE D7 MW Construction Ends		<u></u>			
		 				

November

9	D7 Site Visits
10	D7 Site Visits
11	D11 Site Visits
	OMM D7 Vol 2 Final Document
	PSE D7 BC Construction Status Report Due to Plaintiff
	PSE D7 MW Construction Status Report Due to Plaintiff
	PSE D11 RBF Construction Status Report Due to Plaintiff
	Procurment D11 RBF Construction Status Report Due to Plaintiff
	Procurement D7 MW COnstruction Status Report Due to Plaintif
	Procurement D7 BC Construction Status Report Due to Plaintiff
18	D7 PSE and Procurement Second Decision Point
	D11 PSE and Procurement Second Decision Point
30	OMM D7 Vol 2 Implement OMM Plan
	PSE D11 RBF Construction Ends
	PSE D7 BC Construction Ends
	PSE D7 MW Construction Ends
	Procurement D11 RBF Construction Ends
	Procurement D7 MW Construction Ends
	Procurement D7 BC Construction Ends

December 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
S M 1 2 3 8 9 1 15 16 1	Nov 1998 T W T F S 3 4 5 6 7 0 11 12 13 14 7 18 19 20 21 4 25 26 27 28	PSE D7/D11 Start Monitoring Procurement D7/11 Start Monitoring	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	3 4 5 6 10 11 12 13 17 18 19 20 24 25 26 27 31	T F S 1 2 7 8 9 14 15 16 21 22 23

APPENDIX G

District 7 and 11 Retrofit Pilot Program PS&E Project Schedule For Week Ending 26 Jun 98

	PRO. Montgom	DISTRICT / PROJECT 1 Montgomery Watson	DISTRICT PROJECT Brown & Cale	DISTRICT / PROJECT 2 Brown & Caldwell	DISTE PACE	DISTRICT 11 PACKAGE 1 RBF
	Schedule	Actual/Notes	Schedule	Actual/Notes	Schedule	Actual/Notes
PS&E SUBMITTAL TO DISTRICT (MEETING)	3/18/98	3/25/98	3/18/98	3/25/98	3/16/98	3/16/98
DISTRICT COMMENTS TO CONSULTANTS (MEETING)	4/8/98	4/8/98	4/8/98	4/8/98	3/31/98	3/31/98
REVISED PS&E TO DISTRICT OFFICE ENGINEER, NRDC, and EPA (D 11)	4/15/98	4/15/98	4/15/98	4/15/98	4/7/98	4/7/98
NRDC and EPA COMMENTS TO CALTRANS	4/22/98	4/22/98	4/22/98	4/22/98	4/14/98	4/15/98
Response to Comments to NRDC Response to Comments Meeting with Plaintiffs	4/29/98 4/30/98	4/29/98 4/30/98	4/29/98 4/30/98	4/29/98 4/30/98	4/20/98	4/20/98
DISTRICT OF COMMENTS TO CONSULTANTS	4/29/98	4/29/98	4/29/98	86/9/9	4/21/98	4/21/98
100% DESIGN TO DISTRICT OFFICE ENGINEER	5/6/98	5/7/98	5/6/98	5/6/08	4/28/08	4/28/08
Return Designs to Consultant		5/13/98		5/11/1998		200
Resubmit Designs to Caltrans		5/18/98		5/15/98		
UE FINAI Keview Electronic flots of the Einel DOSE Design Designs authoritied		5/19/98		5/18/98		
Electronic lies of the Final Review Resubmit to OE Final Review		86/2/98		5/29/98		
PS&E DESIGNS TO SACRAMENTO (HQOE)	5/13/98	6/19/98	5/13/98	6/15/98	86/2/9	5/8/98
READY TO LIST (RTL)	5/18/98	86/06/9	5/18/98	86/30/98	5/11/98	5/15/98
DESIGN REPORTS - Complete Design Assumptions Submitted to NRDC	6/1/98	6/1/98	6/1/98	6/1/98	6/1/98	6/1/98
Draft DESIGN REPORTS to Caltrans	5/18/98	5/26/98	5/18/98	5/20/98	5/18/98	5/18/98
1st DECISION POINT (Post Design - Pre-Construction)	6/10/98	6/11/98	6/10/98	6/11/98	6/10/98	6/11/98
CONSTRUCT PROJECTS						
Advertise (ADV)	6/29/98	8/3/98 (est)	6/29/98	8/3/98 (est)	6/22/98	6/22/98
Bid Opening (BO)	7/23/98		7/23/98		7/16/98	107,000,000
Fyerute Contract (EX)	8/20/08		8/20/98		8/6/98	
Begin Construction (BC)	8/25/98	9/21/98 (est)	8/25/98	9/21/98 (pet)	8/18/98	
End Construction	11/30/98	12/1/98 (est)	11/30/98	12/1/98 (est)	11/30/98	
SUPPLEMENTAL REPORT - Construction Status and Problems Submitted to NRDC	11/11/98		11/11/98		11/11/98	
2nd DECISION POINT (Pre-Monitoring)	11/18/98		11/18/98		11/18/98	
	0011101		12/1/9R		12/1/QB	200 1744 20

District 7 and 11 Retrofit Pilot Program Procurement Project Schedule For Week Ending 26 June 98

Schedule Actual/Notes SUBMITTAL TO DISTRICT (MEETING) 4/8/98 4/8/98 DISTRICT COMMENTS TO CONSULTANTS (MEETING) 4/2/98 4/8/98 REVISED SUBMITTAL TO DISTRICT, INRDC, and EPA (District 11) 4/2/9/98 4/2/9/98 NRDC and EPA COMMENTS TO CALTRANS 5/2/98 4/2/9/98 4/2/9/98 Response to Comments to NRDC Response to Comments wheeling with Plaintiffs 5/2/98 5/1/9/98 FINAL CALTRANS COMMENTS TO CALTRANS 5/2/98 5/1/9/98 Response to Comments wheeling with Plaintiffs 5/2/98 5/1/9/98 FINAL CALTRANS COMMENTS TO CONSULTANTS 5/2/98 5/1/9/98 FINAL CALTRANS COMMENTS TO CONSULTANTS 5/2/98 5/1/9/98 MW Trapping Catch Basin Package 6/3/98 6/2/98 MW Trapping Catch Basin Package CONSTRUCTION ENCROACHMENT PERMITS ISSUED 6/3/998 6/2/998 Diratt to REP for Review CONSTRUCT PROJECTS 6/2/998 7/1/4/98 (est) CONSTRUCT PROJECTS 6/3/998 6/1/998 6/1/998 Adventise 6/1/9/98 6/1/9/98 6/1/9/98 Prequalification/IFB	Schedule Actuals	Actual/Notes 4/8/98 4/22/98 5/22/98 5/15/98 7/1/98 (est)	3/16/98 3/31/98 4/7/98 5/1/98 5/1/98 TBD	Actual/Notes 3/16/98 3/31/98
(MEETING)		4/8/98 4/22/98 4/22/98 5/22/98 5/15/98 7/1/98 (est)	3/16/98 3/31/98 4/7/98 5/1/98 5/8/98 TBD	3/16/98
(MEETING)	4/8/98 4/22/98 4/29/98 5/22/98 5/22/98 5/22/98 5/22/98	4/8/98 4/22/98 4/22/98 5/22/98 5/15/98 7/1/98 (est)	3/16/98 3/31/98 4/7/98 5/1/98 5/8/98 TBD	3/16/98
(MEETING)	4/22/98 4/22/98 4/29/98 5/22/98 5/22/98 5/22/98 5/22/98 5/29/98	4/8/98 4/22/98 4/29/96 5/12/98 5/15/98 7/1/98 (est)	3/31/98 4/7/98 5/1/98 5/8/98 TBD	3/16/98
DISTRICT, NRDC, and EPA (District 11) 15.72.98 TS TO CALTRANS TS TO CALTRANS TS TO CALTRANS TS TO CALTRANS TS TO CONSULTANTS ENTS TO CONSULTANTS ENT	4/22/98 4/29/98 5/22/98 5/29/98 1/20/98 5/22/98 5/22/98	4/29/98 4/29/98 5/22/98 5/15/98 7/1/98 (est)	3/31/98 4/7/98 5/1/98 5/8/98 TBD	3/31/98
TS TO CALTRANS TS TO CALTRANS TO CALTRANS TO CONSULTANTS TO CONSUL	4/29/98 5/22/98 5/29/98 7/20/98 5/29/98 6/8/98	4/29/98 5/22/98 5/15/98 7/1/98 (est)	47798 5/1/98 5/8/98 TBD	_
TS TO CALTRANS 5/22/98 TO INDC 5/29/98 Meeting with Plaintiffs TBD ENTS TO CONSULTANTS 5/22/98 ENTS TO CONSULTANTS 5/22/98 KAGE TO ENCROACHMENT PERMITS 5/22/98 ACHIMENT PERMITS ISSUED 6/30/98 ACHIMENT PERMITS ISSUED 6/30/98 In Package 6/23/98 In Package 6/23/98 It Design Assumptions Submitted to NRDC 6/23/98 It Design - Pre-Construction) 6/30/98 It Design - Pre-Construction) 6/12/98 Entry Berry 6/19/98 Entry Berry 6/12/98 Entry Berry 6/12/98 Entry Berry 6/12/98 Entry Berry 6/12/98 Entry Berry 6/15/98	5/22/98 5/29/98 TBD 5/22/98 5/29/98 6/8/98	5/22/98 5/15/98 7/1/98 (est)	5/1/98 5/8/98 TBD	4/7/98
to NRDC Meeting with Plaintiffs Meeting with Plaintiffs ENTS TO CONSULTANTS ENTS TO CO	5/29/98 TBD 5/22/98 5/29/98 6/8/98	5/15/98 7/1/98 (est) 7/6/98 (est)	5/8/98 TBD	21100
Meeting with Plaintiffs TBD ENTS TO CONSULTANTS 5/22/98 KAGE TO ENCROACHMENT PERMITS 5/22/98 ACHMENT PERMITS ISSUED 6/8/98 ACHMENT PERMITS ISSUED 6/30/98 ACHMENT PERMITS ISSUED 6/30/98 In Package 6/23/98 iew 6/19/98 it Design - Pre-Construction) 6/30/98 it Design - Pre-Construction) 6/12/98 e 6/19/98 e 6/26/98	5/22/98 5/29/98 6/8/98	5/15/98 7/1/98 (est) 7/6/98 (est)	TBD	5/8/98
ENTS TO CONSULTANTS 5/22/98 KAGE TO ENCROACHMENT PERMITS 5/29/98 In Package 6/8/98 ACHIMENT PERMITS ISSUED 6/8/98 In Package 6/30/98 In Package 6/30/98 In Package 6/30/98 It Design Assumptions Submitted to NRDC 6/30/98 It Design - Pre-Construction) 6/30/98 It Design - Pre-Construction) 6/12/98 It Design - Pre-Construction 6/19/98 It Design - Pre-Construction 6/19/98	5/22/98 5/29/98 6/8/98	5/15/98 7/1/98 (est) 7/6/98 (est)		
KAGE TO ENCROACHMENT PERMITS 5/29/98 in Package 6/8/98 ACHIMENT PERMITS ISSUED 6/8/98 ACHIMENT PERMITS ISSUED 6/30/98 In Package 6/30/98 iew 6/33/98 it Design - Pre-Construction) 6/30/98 it Design - Pre-Construction) 6/12/98 e 6/19/98 e 6/26/98	6/8/98	7/1/98 (est) 7/6/98 (est)	5/15/98	5/22/98 & 5/26/98
ACHMENT PERMITS ISSUED in Package line Package line Design Assumptions Submitted to NRDC 6/30/98 6/30/98 it Design - Pre-Construction) 6/30/98 6/12/98 6/12/98 6/12/98	8(8/38	7/6/98 (est)	86/8/9	5/27/98
in Package In Package Isolate Design Assumptions Submitted to NRDC 6/33/98 6/12/98 6/12/98 6/12/98 6/12/98 6/12/98	OCION	(1990 (691)	5/12/00	90/60/9
Sumptions Submitted to NRDC	00000			
ti Design - Pre-Construction) 6/30/98 6/830/98 6/12/98 6/12/98 6/12/98 6/15/98 6/15/98 6/15/98 6/15/98	0/20/20		6/10/98	6/10/98
6/8/98 it Design - Pre-Construction) 6/30/98 6/12/98 6/19/98 e 6/26/98	6/23/98	6/24/98	6/3/98	86/2/98
tt Design - Pre-Construction) 6/30/98 6/12/98 6/12/98 6/12/98 6/26/98 6/27/98	86/8/9	6/18/98	5/27/98	6/1/98
0	86/30/98	7/14/98 (est)	6/20/98	6/22/98
			6/1/98	6/1/98
	N/A	The state of the s	6/15/98	6/25/98
	N/A		6/22/98	86/30/98
	7/15/98		7/10/98	
Ld	7/29/98		7/18/98	
Califans Review Award	86/2/8		7/25/98	
Confinatory Submits Bonds and Executed Confract Morina to Discound	0/11/00		9017017	
	8/15/98		8/3/08	
	11/30/98		11/30/98	
SUPPLEMENTAL REPORT - Construction Status and Problems Submitted to 11/11/98	11/11/98		11/11/98	
2nd DECISION POINT (Pre-Monitoring)	11/18/98		11/18/98	
START STORM WATER MONITORING	12/1/98		12/1/98	

Caltrans Stormwater Retrofit Pilot Studies Operation, Maintenance, and Monitoring Plan Development Schedule District 7

Tools Name	Working	Chart	Finish	A = 4 . = 1
Task Name	Days	Start	Finish	Actual
Kick Off Meeting	0 days	01-May-98		01-May-98
Mid-Course Meeting	44E dave	01-Jul-98	01-Jul-98	01-Jul-98
DISTRICT 7	145 days	04-May-98	30-Nov-98	
DRAFT OUTLINES	27 days	00-Jan-00	10-Jun-98	
Caltrans Review	5 days	12-May-98	18-May-98	
Plaintiff Review and Comment	5 days	21-May-98	28-May-98	
Finalize Outline/Table of Contents	3 days	08-Jun-98	10-Jun-98	22-Jun-98
PREPARE VOLUME I	61 days	18- M ay-98	12-Aug-98	
Prepare Draft Vol I	43 days	18-May-98	17-Jul-98	
Caltrans Review	8 days	20-Jul-98	29-Jul-98	
100% Draft	10 days	30-Jul-98	12-Aug-98	
VOL I PLAINTIFF REVIEW	42 days	12-Aug-98	12-Oct-98	
Plaintiff Review	15 days	13-Aug-98	02-Sep-98	
Response to NRDC Comments	7 days	03-Sep-98	14-Sep-98	
NRDC Final Review	5 days	29-Sep-98	05-Oct-98	
Final Vol I Revisions	5 days	06-Oct-98	12-Oct-98	
PREPARE VOLUME II	51 days	22-Jun-98	01-Sep-98	
Prepare Draft Vol II	33 days	22-Jun-98	06-Aug-98	
Caltrans Review	10 days	07-Aug-98	20-Aug-98	
100% Draft	8 days	21-Aug-98	01-Sep-98	
VOL II PLAINTIFF REVIEW	50 days	02-Sep-98	11-Nov-98	
Plaintiff Review	15 days	10-Sep-98	30-Sep-98	
Response to NRDC Comments	7 days	01-Oct-98	09-Oct-98	
NRDC Final Review	5 days	26-Oct-98	30-Oct-98	
Final Vol II Revisions	8 days	02-Nov-98	11-Nov-98	
FINAL DOCUMENT	10 days	12-Nov-98	30-Nov-98	
Final Edit and Publication	9 days	12-Nov-98	24-Nov-98	
Implement Plan	0 days	30-Nov-98	30-Nov-98	

Caltrans Stormwater Retrofit Pilot Studies Operation, Maintenance, and Monitoring Plan Development Schedule District 11

	Working			
Task Name	Days	Start	Finish	Actual
Kick Off Meeting	0 days	1-May-98	1-May-98	1-May-98
Mid-Course Meeting		1-Jul-98	1-Jul-98	1-Jul-98
DISTRICT 11	122 days	4-May-98	26-Oct-98	
DRAFT OUTLINES	27 days	4-May-98	10-Jun-98	
Caltrans Review	5 days	12-May-98	18-May-98	
Plaintiff Review and Comment	5 days	21-May-98	28-May-98	
Finalize Outline/Table of Contents	3 days	8-Jun-98	10-Jun-98	22-Jun-98
PREPARE VOLUME I	61 days	18-May-98	12-Aug-98	
Prepare Draft Vol I	43 days	18-May-98	17-Jul-98	
Caltrans Review	8 days	20-Jul-98	29-Jul-98	
100% Draft	10 days	30-Jul-98	12-Aug-98	
VOL I PLAINTIFF REVIEW	42 days	12-Aug-98	12-Oct-98	
Plaintiff Review	15 days	13-Aug-98	2-Sep-98	
Response to NRDC Comments	7 days	3-Sep-98	14-Sep-98	
NRDC Final Review	5 days	29-Sep-98	5-Oct-98	
Final Vol I Revisions	5 days	6-Oct-98	12-Oct-98	
PREPARE VOLUME II	46 days	8-Jun-98	11-Aug-98	
Prepare Draft Vol II	33 days	8-Jun-98	23-Jul-98	
Comments to Consultants (Meeting)	0 days	30-Jul-98	30-Jul-98	
100% Draft	8 days	31-Jul-98	11-Aug-98	
VOL II PLAINTIFF REVIEW	49 days	12-Aug-98	20-Oct-98	
Plaintiff Review	15 days	19-Aug-98	9-Sep-98	
Response to NRDC Comments	7 days	10-Sep-98	18-Sep-98	
NRDC Final Review	5 days	5-Oct-98	9-Oct-98	
Final Vol II Revisions	8 days	9-Oct-98	20-Oct-98	
FINAL DOCUMENT	3 days	21-Oct-98	26-Oct-98	
Final Edit and Publication	3 days	21-Oct-98	23-Oct-98	
Implement Plan	0 days	26-Oct-98	26-Oct-98	